1966 FACT BOOK

400 000

NAVAL RESEARCH LABORATORY

WASHINGTON, D.C.

Report Documentation Page

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	5e. TASK NUMBER
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unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**88**	

This document has been prepared as a reference source of factual information about the Naval Research Laboratory.

July 1966

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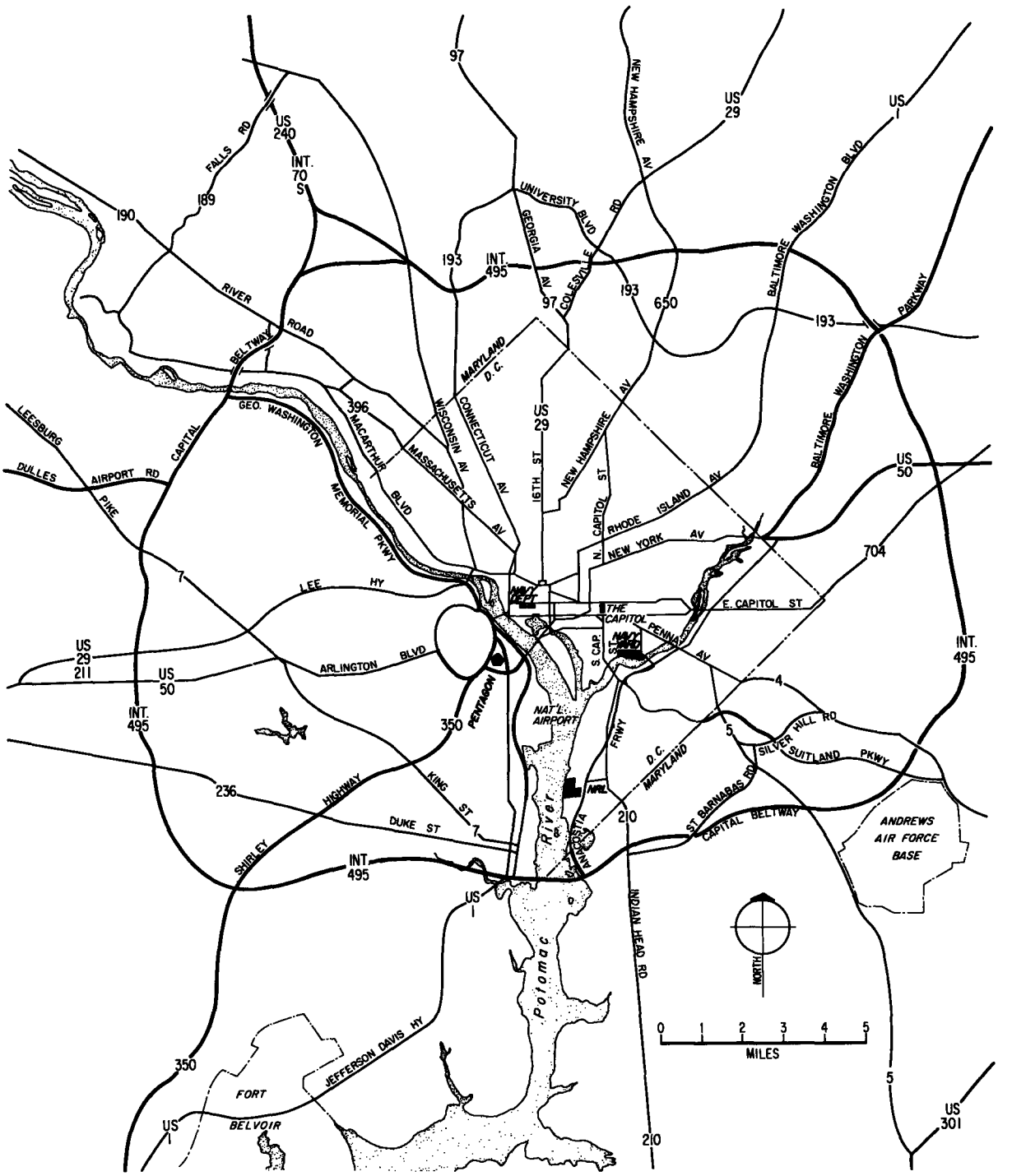
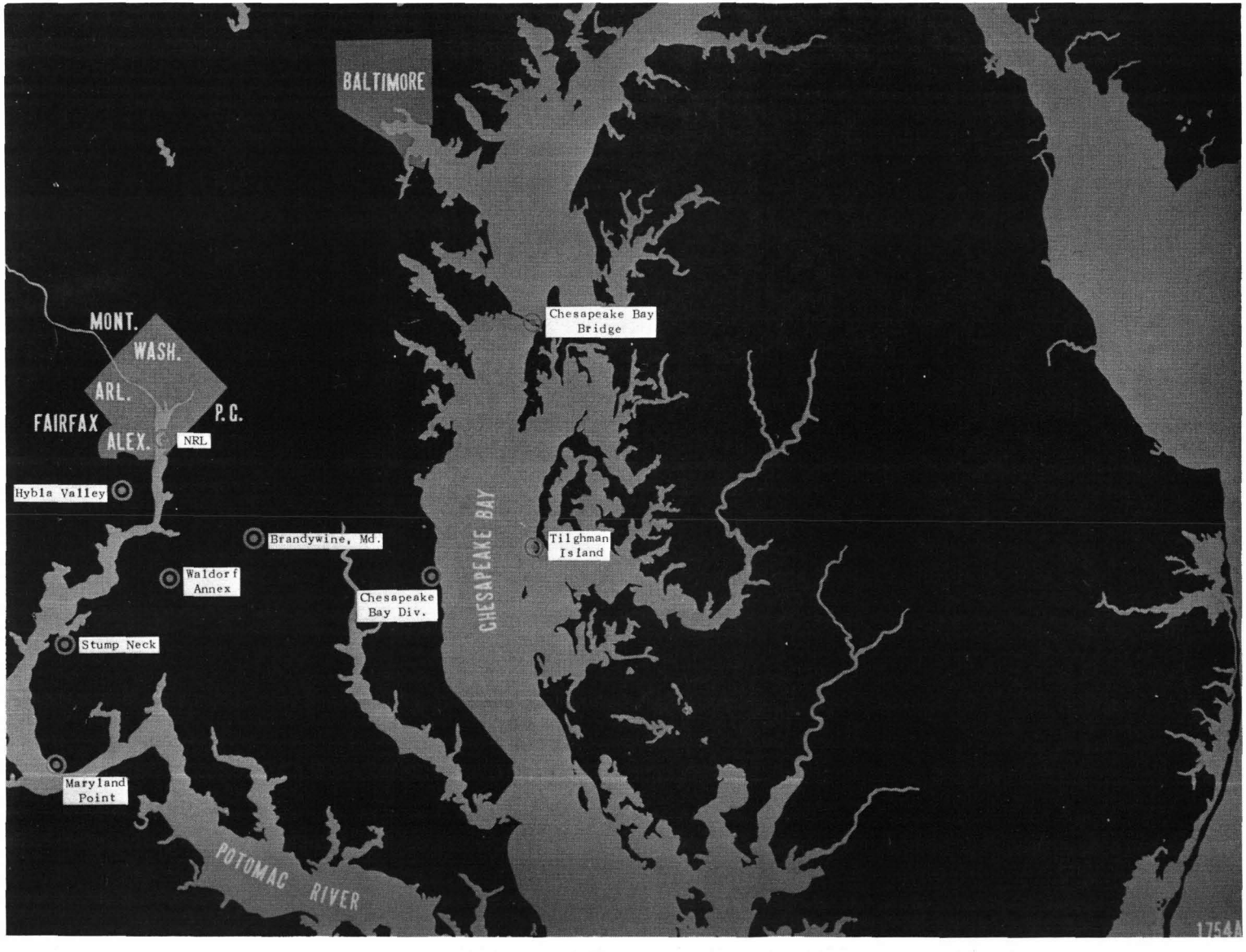
The Corporate Structure



Map showing location of NRL

Aerial view of the Naval Research Laboratory main site



Location of the principal field stations. Others are at Sugar Grove, W. Va., and on Lake Seneca, N. Y. (near Dresden). The Underwater Sound Reference Division is located at Orlando, Fla.

DETAILED LISTING OF NRL STATIONS

July 1, 1966

Station and Location	Acreage			Class I & II Plant Value	Total Buildings, Structures, and Utilities
	Fee Title	Easement or Purchase	Permit or Lease		
Naval Research Laboratory Washington, D.C.	125.90		1 29	$36,641,606	183
Radio Research Site, Blue Plains, D.C			24 73	1,900	3
Sector Focusing Cyclotron, Bolling Air Force Base, D.C.			5 24		
Environmental Surveillance Sites 2 & 3 Anacostia Freeway, D.C.			NA		
Environmental Surveillance Site 4, D.C. Village			NA		
Environmental Surveillance Site 5, D.C Sewage Plant			NA		
Environmental Surveillance Site 6, Slater's Lane, Alexandria, Va			NA		
Environmental Surveillance Site 7, Sailing Marina, Alexandria, Va			NA		
Radio Research Site, Coast Guard Radio Station, Alexandria, Va.			55.40		
Pier for Sound Barge, Alexandria, Va.			NA		
Optical Observation Tower, Federal Records Center, Alexandria, Va.			NA		
Radio Test Area, Hybla Valley, Va.			1262.46		
A&A Test Site, Shenandoah National Park, Luray, Va.			NA		
Optics Experimental Site, Ginny Beach, Va.			46		
NRL Chesapeake Bay Division, Chesapeake Beach, Md.	174 90			9,570,111	208
Multiple Research Site, Tilghman Island, Md.	2.00			81,617	7
Dock Facility, Chesapeake Bay, Md.			.60	13,505	3
Theodolite Station, North Beach, Md.			.29	800	1
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			23	1,500	2
2 Foghorn Platforms Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Chesapeake Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35 16		1,181,249	43
A&A Research Facility, Maryland Point, Md	24.30		200.00	187,437	22
Radio Antenna Range, USAF Receiver Site, Brandywine, Md.			22.98		
Radio Research Site, Stump Neck, Md.			5.90		
Navy Radio Research Station, Sugar Grove, West Va.	615.98	43.56		205,050	10
Transducer Calibration Facility, Dresden, Lake Seneca, N.Y			4.52	24,243	2
Satellite Tracking Station, Rio Grande, Roma, Texas	27.84	1.00		724,536	12
Satellite Tracking Station, Raymondville, Texas	171.55	2 85		1,209,599	10
Underwater Sound Reference Laboratory, Orlando, Fla.	10.46			1,184,605	39
Underwater Sound Reference Laboratory, Bugg Spring, Fla			6 81	99,171	4
Marine Corrosion Laboratory, Key West, Fla			NA		
Underwater Track Facility, Argus Island (near Bermuda)			NA		
Totals	1176.87	82.57	1590 91	$51,126,929	

RESEARCH PLATFORMS

Aircraft

1. The S2D (BUNO 149240), contains specially installed equipment and wing-mounted pods for cloud physics research. Also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.

2. The C-54 (BUNO 50851), presently being used for the Omega Navigation system, Project Blocker, and various short-term projects requiring only minor aircraft modifications.

3. The EC-121-K (BUNO 128324), used strictly for wave propagation studies in the four-frequency radar system.

4. The EC-121-K (BUNO 135753), used for research in cloud physics, navigation, low-frequency radar, and other projects requiring only minimal aircraft conversion.

5. The EC-121-K (BUNO 191297), used basically for matched filter radar project. Equipment for navigation experiments and other projects requiring only a small space may be installed.

Available Ships

1. USNS MIZAR (AGOR-11), scheduled by NRL.

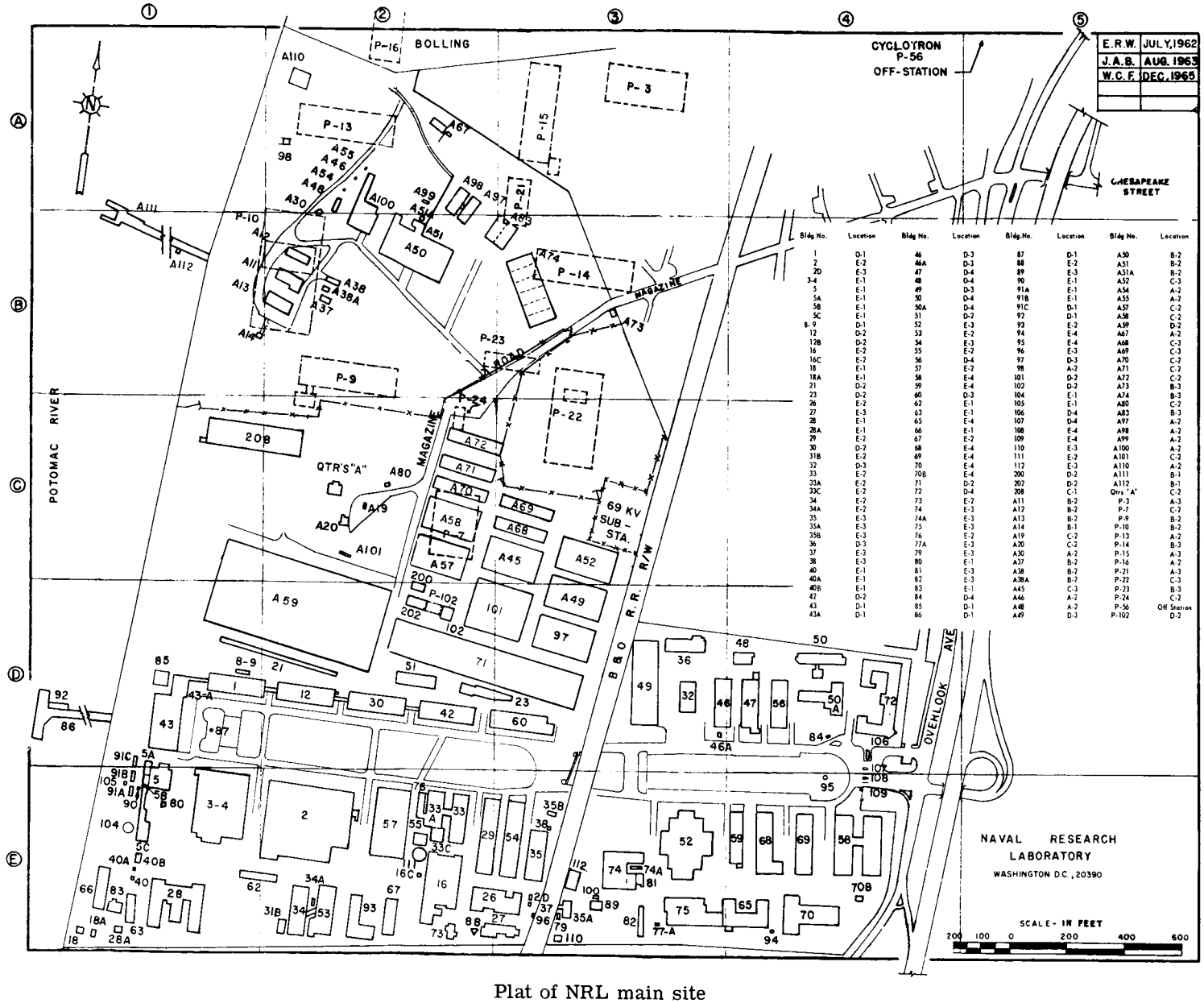
2. USNS GILLISS (T-AGOR-4), USNS SANDS (T-AGOR-6), and USNS LYNCH (T-AGOR-7). Each under OPCON of MSTSLANT for utilization East Coast Navy Labs with direction of NAVOCEANO; schedules prepared by NRL.

3. USNS MISSION CAPISTRANO (T-AG-162), under OPCOM of MSTSLANT for use in ONR-supported Project Artemis. Former tanker modified to accommodate a high-powered sonar transducer, approximately five stories high and weighing hundreds of tons, which is lowered through center well.

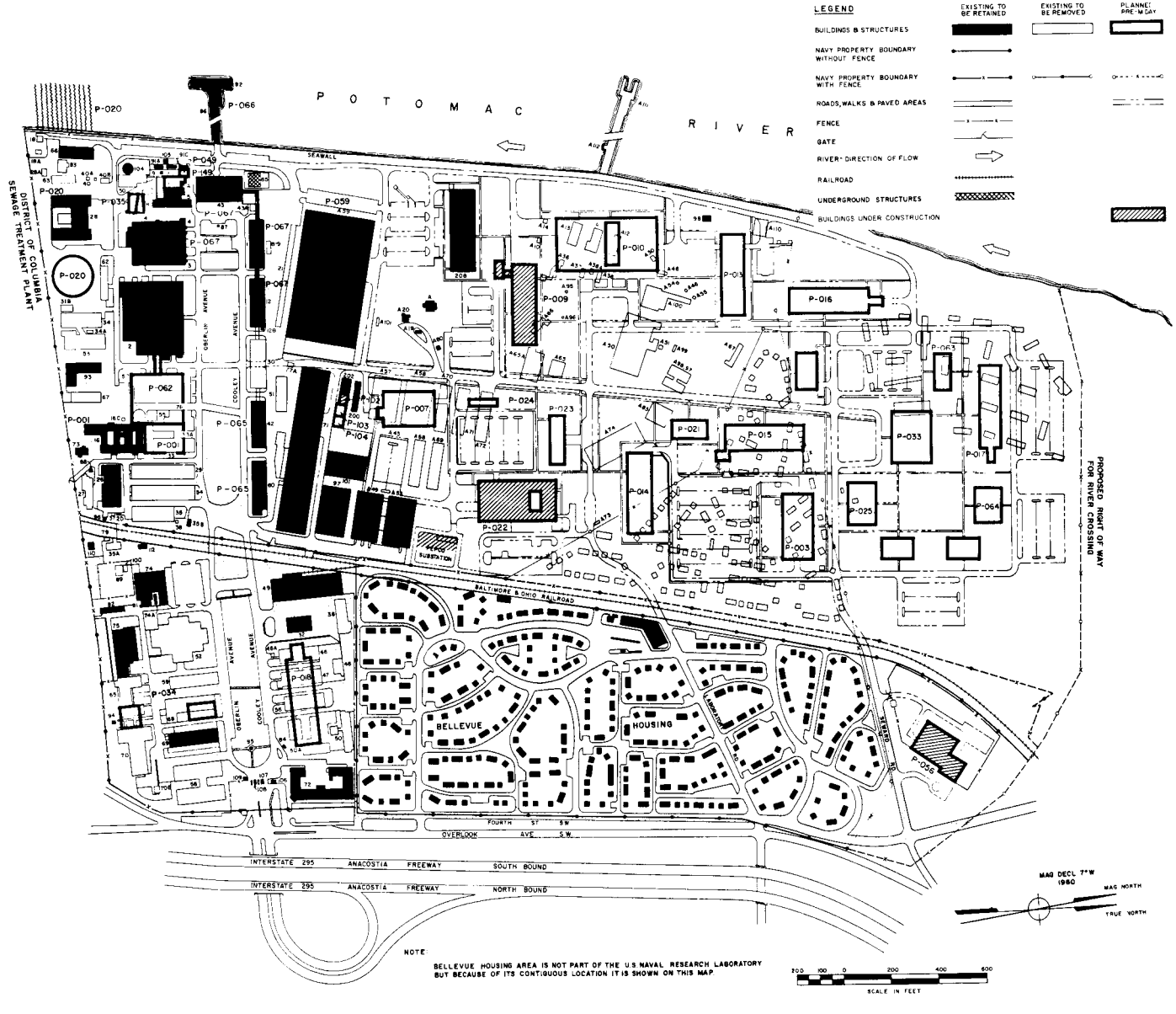
4. AG(SS)214, GROUPER. Carries the SDG sonar.

5. SSX-1, used mainly with Project Clinker; scheduled by NRL.

6. Other surface vessels and submarines occasionally scheduled for NRL use by OPTEVFOR.



Plat of NRL main site



General development plan

THE NAVY'S CORPORATE LABORATORY

The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that the advances made by science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in electromagnetic wave propagation, underwater sound propagation, atmospheric light propagation, refractory metals and exotic materials for high-performance structures, surface chemistry, high-temperature lubricants, submarine air purification, chemical oceanography, structural design theory, metallurgy in all aspects of the sea environment, cryogenic physics, plasma physics, and solar radiation and its effects on environmental phenomena near the earth. The NRL FY 1967 Program Budget is $77.2 million.

The Laboratory has about 3500 employees, including over 1100 professional scientists and engineers. During the year 1965, almost 260 official technical reports were issued, about 220 scientific papers were published in professional journals, and some 300 scientific presentations were made at meetings, both at home and in many foreign countries. Also, in the same year, 72 patents were issued to NRL personnel, and 91 additional applications were filed with the U.S. Patent Office.

In its investigations of broad scientific areas, in considering these for potential military applications, and in furnishing to the naval systems commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. Thus it provides a central focus of research and development activity that supports the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the other armed services, the Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.

MISSION

The mission of the Naval Research Laboratory is to conduct scientific research and development in the physical sciences and related fields directed toward new and improved materials, equipment, techniques, and systems for the Navy. In fulfillment of this mission, the Naval Research Laboratory:

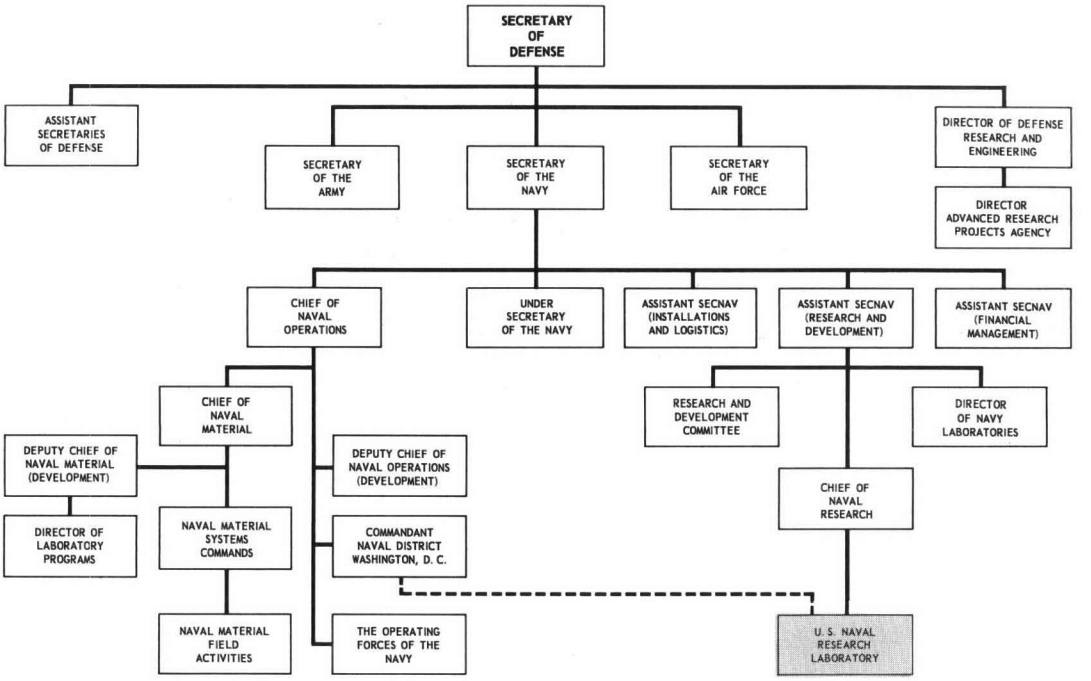
1. Initiates and conducts scientific research and development of a basic and long-range nature in scientific areas of special interest to the Navy.

2. Performs scientific research and development for the Systems Commands and offices of the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

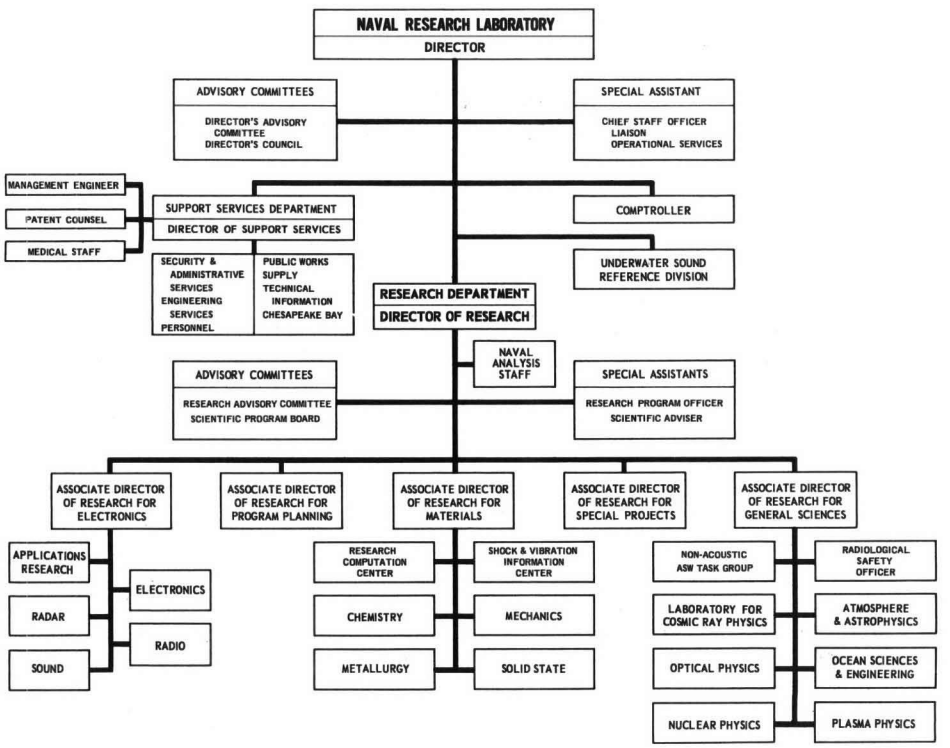
3. Provides to the Navy and its contractors standardized techniques and procedures for measurements and for the accurate calibration of standard instruments in areas of special Navy needs.

4. Furnishes scientific consultative services for the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

5. Provides to the Navy unbiased determination of performance characteristics of developmental and prototype devices through limited engineering test and evaluation services.



Position of NRL in the Department of Defense structure



Organization chart of NRL

FISCAL INFORMATION

OBLIGATIONS BY MAJOR SPONSOR
R&D Projects FY 1965-1967

Sponsor	FY 1965		FY 1966 (Est)		FY 1967[a] (Est)	
	Millions of Dollars	Percent	Millions of Dollars	Percent	Millions of Dollars	Percent
ONR[b]	24.4	34	25.2	35	29.0	37
SHIP SYS[c]	13.0	18	10.0	14	10.5	14
ELEC SYS			2.1	3	1.6	2
AIR SYS[d]	17.5[e]	24	13.9	20	12.1	16
ORD SYS			0.2		0.2	
OTHER NAVY	3.6	4	2.0	3	1.7	2
TOTAL NAVY	58.5	80	53.4	75	55.1	71
OTHER DOD	9.1	13	13.7	19	16.0	21
NON-DOD	5.0	7	4.2	6	6.1	8
TOTAL FUNDS	72.6	100	71.3	100	77.2	100

[a] Includes obligations for USRD.
[b] Excludes class V (plant account) funds for capital improvements as follows: 0.9 for FY 1965, 1.0 for FY 1966, and 1.3 for FY 1967.
[c] Formerly BuShips
[d] Formerly BuWeps
[e] Includes 4.3 OPN funds

OPERATING COSTS*
(Excluding Plant Account Funds)
FY 1965-1966

Purpose	During FY 1965	During first 10 months of FY 1966
Materials, supplies, and parts	9,815,000	8,343,000
Salaries and wages	34,264,000	29,054,000
Contractural services and other costs	27,155,000	22,440,000
Total	71,234,000	59,837,000

CAPITAL PROPERTY*

	As of April 30, 1966
Class 1 (Land)	429,420
Class 2 (Buildings and improvements)	49,314,272
Class 3 (Equipment)	18,937,945
Class 4 (Industrial production equipment)	4,702,214
Total Capital Property	73,383,851

*Information for Underwater Sound Reference Division not included.

MILITARY AND CIVILIAN PERSONNEL*

Military Personnel Attached to NRL as of July 1, 1966

Officers	*Authorized*	*On Board*
Captain	3	2
Commander	10	9
Lieutenant Commander	10	8
Lieutenant	6	10
Lieutenant (Junior Grade)	1	1
Ensign	0	1
Warrant Officer	0	0
Total	30	31
Enlisted	74	77

Civilian Employees on Rolls as of March 31, 1966

Public Law 313 (ST)		23
Classification Act (GS)		2347
Scientific & Professional	1122	
Technical Supporting	562	
General Administrative & Clerical	663	
Wage Board		885
General Wage Service (WB)	725	
Apprentices, Planning, Estimating, etc. (WD)	65	
Printing & Lithographic Service (WI)	16	
Supervisory General Wage Service (WS)	72	
Inspection Service (WX)	7	
Total		3255

Annual Civilian Turnover Rate (percent)

	1963	1964	1965
Research Department	6.3	3.7	9.5
Nonresearch Areas	11.0	9.8	12.8
Entire Laboratory	7.5	6.7	11.1

Highest Academic Degrees Held by Permanent Employees as of December 31, 1965

Bachelors	726
Masters	256
Doctors	217

*Information concerning civilian personnel of the Underwater Sound Reference Division is not included under this heading.

AWARDS RECEIVED BY CIVILIAN EMPLOYEES*

As of July 1, 1966

Government Awards	Number
The Medal of Merit from the President of the United States	1
The Certificate of Merit from the President of the United States	11
The President's Award for Distinguished Federal Civilian Service	2
Department of Defense Distinguished Civilian Service Award	4
Department of Defense Certificate of Merit	1
Department of the Navy Award for Distinguished Achievement in Science	2
Navy Distinguished Civilian Service Award	49
Navy Captain Robert Dexter Conrad Award	2
Navy Superior Civilian Service Award (established 1959)	20
Navy Meritorious Civilian Service Award	178
E. O. Hulburt Annual Science Award (local NRL award)	11
Non-Government Awards	
Henry Draper Medal of the National Academy of Sciences	1
Engineering Science Award of the Washington Academy of Sciences	3
Award in the Physical Sciences of the Washington Academy of Sciences	3
Morris Liebmann Memorial Prize of the Institute of Radio Engineers	1
Medal of Merit Award of the Institute of Radio Engineers	2
Harry Diamond Award of the Institute of Radio Engineers	4
John Scott Medal of the City of Philadelphia	1
Patrons Award of the Institute of Radio Engineers (Washington section)	1
Frederic Ives Award of the Optical Society of America	2
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
John A. Penton Gold Medal of the American Foundrymen's Society	1
Burgess Prize Award of the American Society for Metals	2

*Information concerning civilian personnel of the Underwater Sound Reference Division is not included under this heading.

Non-Government Awards (Continued)	Number
Charles B. Dudley Medal of the American Society for Testing Materials	1
Gold Medal Award of the American Society of Naval Engineers	1
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	1
A. K. Doolittle Award of the National American Chemical Society	1
Kendall Company Award of the American Chemical Society	1
Hillebrand Prize of the American Chemical Society	1
William Blum Award of the Washington-Baltimore Electrochemical Society	1
National Award of the American Society of Lubrication Engineers	1
Annual Award of the Society for Applied Spectroscopy	1
E. Edward Pendray Award of the American Rocket Society	1
James H. Wyld Memorial Award of the American Rocket Society	1
Space Science Award of the American Institute of Aeronautics and Astronautics	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	1
Janssen Medal of the French Photographic Society	1
Ancel Prize of the French Photographic Society	1
Progress Award of the Photographic Society of America	1
Professional Achievement Award of the D. C. Council of Engineers and Architectural Studies	1
National Capital Award of the D. C. Council of Engineers and Architectural Studies	3
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Reliability and Quality Control Award of the Radio Engineers Professional Group	1
Service to Mankind Award of the Washington Sertoma Club	1
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	1
Pure Science Award of the Scientific Research Society of America (NRL Branch)	11
Applied Science Award of the Scientific Research Society of America (NRL Branch)	11
Arthur S. Fleming Award of the Washington Chamber of Commerce	1
Notre Dame Centennial of Science Award	2

Captain Thomas B. Owen

DATE OF BIRTH:	March 19, 1920
PLACE OF BIRTH:	Seattle, Washington
RESIDENCE ADDRESS:	5400 Greystone St., Chevy Chase, Maryland
MARITAL STATUS:	Married. Wife: Rosemary Stolz Owen. Children: Catherine, Thomas, Jr., James, and Nancy
EDUCATION:	University of Washington, BS (cum laude) 1940 U.S. Naval Postgraduate School, 1946-47 Navy Advanced Science Program, Cornell University, PhD (Chemistry) 1950 University of Amsterdam, Netherlands, Postdoctoral work (1950-51) Industrial College of Armed Forces, 1961-62 Advanced Management Program, Harvard Graduate School of Business Administration, Sept-Dec 1964

EXPERIENCE:

Combat duty with Pacific Fleet	Mar 1941-Apr 1945
Bureau of Naval Personnel, Officer Distribution Division	Jun 1945-Jun 1946
Office of Naval Research in Armaments Branch and Military Operations Branch	Jul 1951-Jul 1953
Assistant Repair Superintendent (Hull) and Production Analysis Superintendent, Long Beach Naval Shipyard	Aug 1953-Jun 1957
Director of Applied Sciences Division and Director, Research and Development Planning Division, Navy Bureau of Ships	Jul 1957-Jul 1961
Military Assistant to Deputy Director of Defense Research and Engineering (Engineering and Chemistry)	Jun 1962-Mar 1963
Temporary duty with Office of the Assistant Secretary of the Navy (R&D), with ultimate assignment as Director of Support Services, Naval Research Laboratory	Mar 1963-Jan 1965
Director, Naval Research Laboratory	Jan 1965

DECORATIONS:	Silver Star, Bronze Star, and numerous campaign medals, including the Asiatic-Pacific Campaign Medal with 12 battle stars.

Captain Thomas B. Owen, USN
Director, Naval Research Laboratory

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Research Department

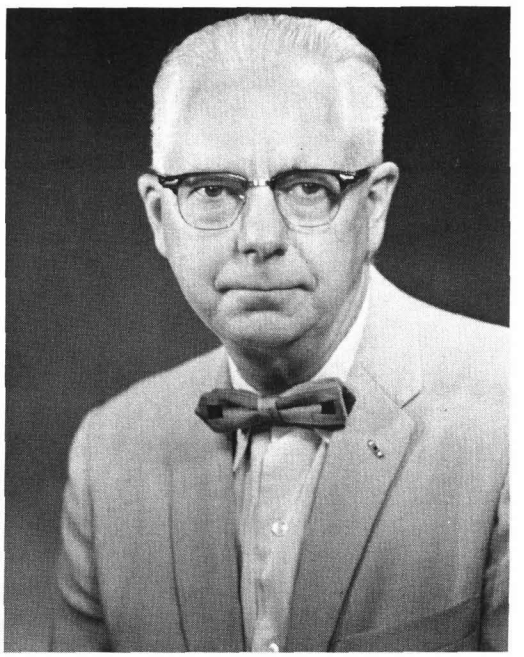
THE RESEARCH DEPARTMENT

The Research Department is headed by a civilian director of research. The research effort is divided into three major fields–electronics, materials, and general sciences–which correspond to the principal areas of the Navy's interest in the physical and engineering sciences. There is an associate director of research for each of these three broad areas. Fifteen scientific divisions, each headed by a civilian scientist, pursue work in specific fields. Branches within these divisions form interrelated working units.

The director of research is also assisted by two other associate directors, one for program planning and one for special projects.

Office of Director of Research

Code 4000	Director of Research	Dr. R. M. Page
4005	Staff Adviser for Naval Analysis	Dr. P. Waterman (Acting)
4007	Scientific Adviser	Dr. N. W. Rakestraw
4010	Research Program Officer	Mr. A. Hollings
4100	Associate Director of Research for Program Planning	
4200	Associate Director of Research for Special Projects	Dr. A. H. Schooley
5000	Associate Director of Research for Electronics	Dr. C. E. Cleeton
6000	Associate Director of Research for Materials	Dr. R. L. Dolecek
6010	Research Computation Center	Mr. A. B. Bligh
6020	Shock & Vibration Information Center	Dr. W. W. Mutch
7000	Associate Director of Research for General Sciences	Dr. W. C. Hall
7005	Director, ASW (R&D) Task Group	Dr. J. O. Elliot
7010	Radiological Safety Officer	Mr. L. A. Brauch
7020	Chief Scientist, Laboratory for Cosmic Ray Physics	Dr. M. M. Shapiro



Dr. Robert M. Page
Director of Research
Naval Research Laboratory

Dr. Page [redacted]. He received the B.S. degree in physics from Hamline University, St. Paul, Minnesota, in 1927, the M.S. degree in physics from George Washington University, Washington, D.C., in 1932, and was awarded an Honorary Doctor of Science degree by Hamline University in 1943.

From 1927 to the present, Dr. Page has been at the Naval Research Laboratory, working mainly with precision instrumentation in the field of electronics. In 1934 he developed the first pulse radar in the world for detection of aircraft, for which he has received the U.S. Navy Distinguished Civilian Service Award, the Presidential Certificate of Merit, an IRE Fellowship, the Harry Diamond Memorial Award of IRE, and the Stuart Ballantine Medal of the Franklin Institute. In recognition of technical and scientific achievement in research and development for the United States Navy, he was given the Captain Robert Dexter Conrad Award. In March of 1960 he was presented with the President's Award for Distinguished Federal Civilian Service.

Dr. Page holds over 45 patents, mostly in radar. He has authored a book, "The Origin of Radar," in addition to numerous technical articles and lectures.

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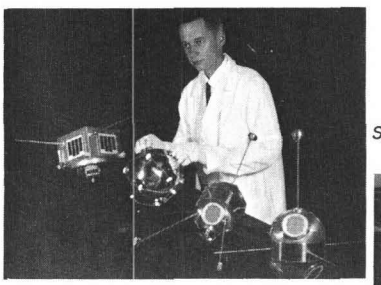
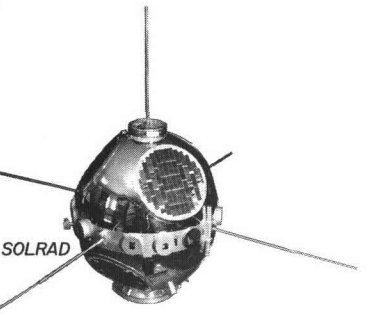
Electronics Area

Associate Director of Research for Electronics
Dr. C. E. Cleeton

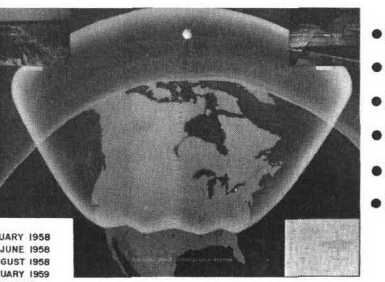
APPLICATIONS RESEARCH



SATELLITE PREPARATION



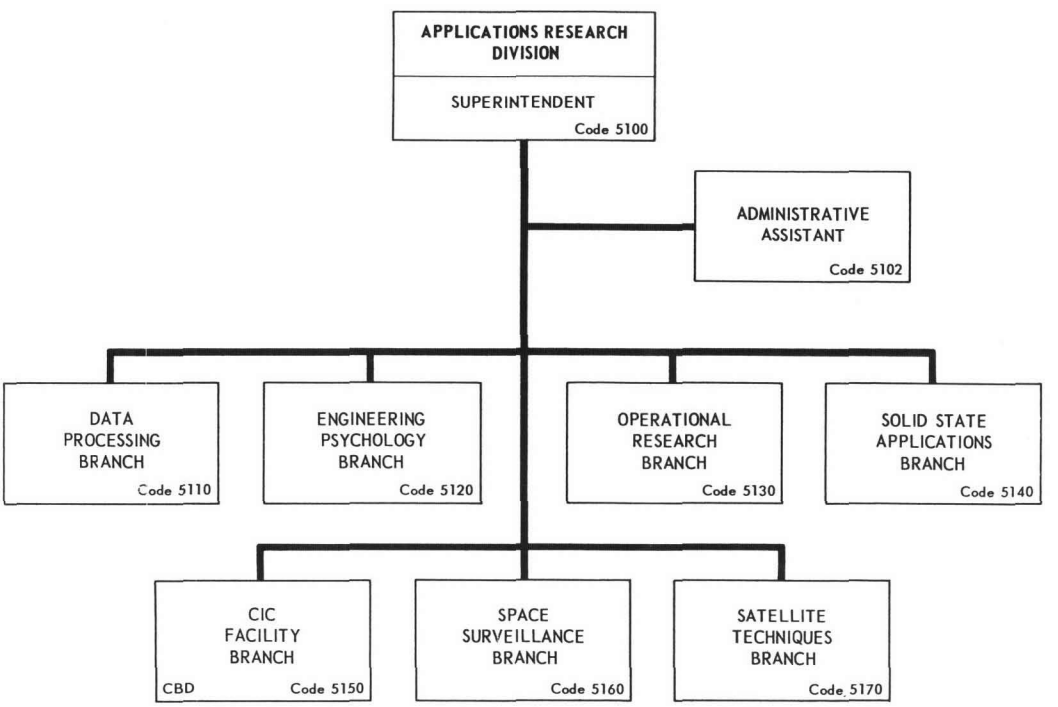
SOLRAD



SPASUR FENCE

- DATA PROCESSING
- ENGINEERING PSYCHOLOGY
- OPERATIONAL RESEARCH
- CIC FACILITY
- SPACE SURVEILLANCE
- SATELLITE TECHNIQUES

SYSTEM PROPOSED BY NRL: FEBRUARY 1958
PROJECT AUTHORIZED BY ARPA: JUNE 1958
FIRST OBSERVATION: AUGUST 1958
WESTERN COMPLEX IN FULL-TIME OPERATION: FEBRUARY 1959
SYSTEM TRANSFERRED FROM ARPA TO NAVY: OCTOBER 1960
KICKAPOO TRANSMITTER IN OPERATION: JUNE 1961
PRESELECTORS ADDED TO RECEIVERS: MAY-DECEMBER 1961
5600 FOOT ALERT ANTENNA INSTALLED AT FORT STEWART: OCTOBER 1962



BASIC RESPONSIBILITIES

The Applications Research Division conducts basic and applied research, together with evaluation and consultation, relative to systems and military applications of space. Current effort is devoted largely toward design and utilization of satellites and systems for navigation, space object classification, orbits, and space surveillance.

BRANCHES

Data Processing

- Manned orbitting laboratory experiments
- Intercept control
- Data processing and display
- IFF display
- Lasers for data processing
- Space physics and quantum electronics

Engineering Psychology

- Man-machine engineering
- Human engineering of aircraft instrumentation
- Human engineering of submarine instrumentation
- Aircraft landing aids

Operational Research

- Orbit computation
- Computation and digital facilities (for SPASUR)
- Navy fire control and data processing

Solid State Applications

- Radiation effects on semiconductor material and devices used in satellites
- Radiation effects on dielectric materials

CIC Facility (at CBD)

- Technical evaluation of radar indicators and switchboards
- Correlation and compatibility studies of command combat direction stations and Combat Information Centers (CIC)

Space Surveillance

- Profile techniques
- Space surveillance
- Rapid navigation satellite readout

Satellite Techniques

- Satellite development
- Calibration satellites
- Research satellites, especially solar radiation devices
- Navigation satellites

Key Personnel

Name	*Title*	*Grade or Rank*
Dr. W. R. Faust	Superintendent	PL 313
Dr. W. S. Ament	Consultant	GS-15
Mr. E. F. Kulikowski	Head, Data Processing Branch	GS-15
Mr. H. P. Birmingham	Head, Engineering Psychology Branch	GS-15
Mr. C. H. Chrisman	Head, Operational Research Branch	GS-15
W. L. Landreth	Head, CIC Facility	CDR, USN
Mr. R. L. Easton	Head, Space Surveillance Branch	GS-16
Mr. P. G. Wilhelm	Head, Satellite Techniques Branch	GS-14
Mr. E. L. Brancato	Head, Solid State Applications Branch	GS-15

Personnel Complement

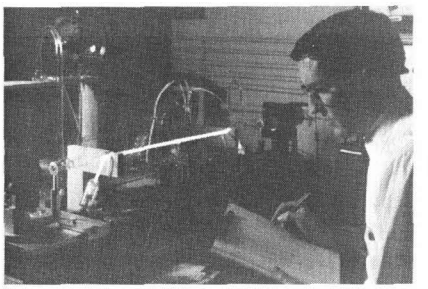
Ceiling: 170 On Board: 163

Total Estimated R&D Funding

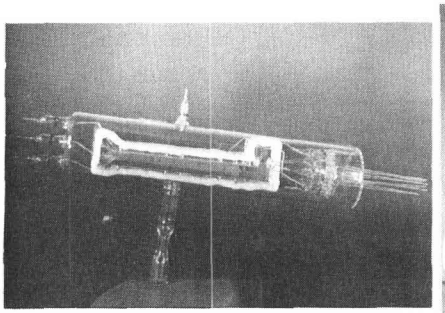
Fiscal Year 1967: $8,249,000

ELECTRONICS

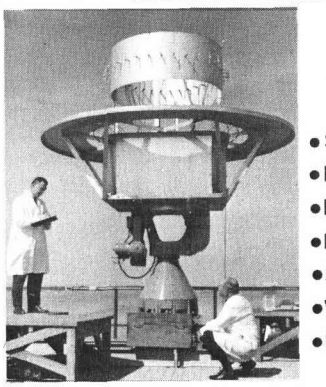
MICRO-CIRCUITRY



GAS LASERS

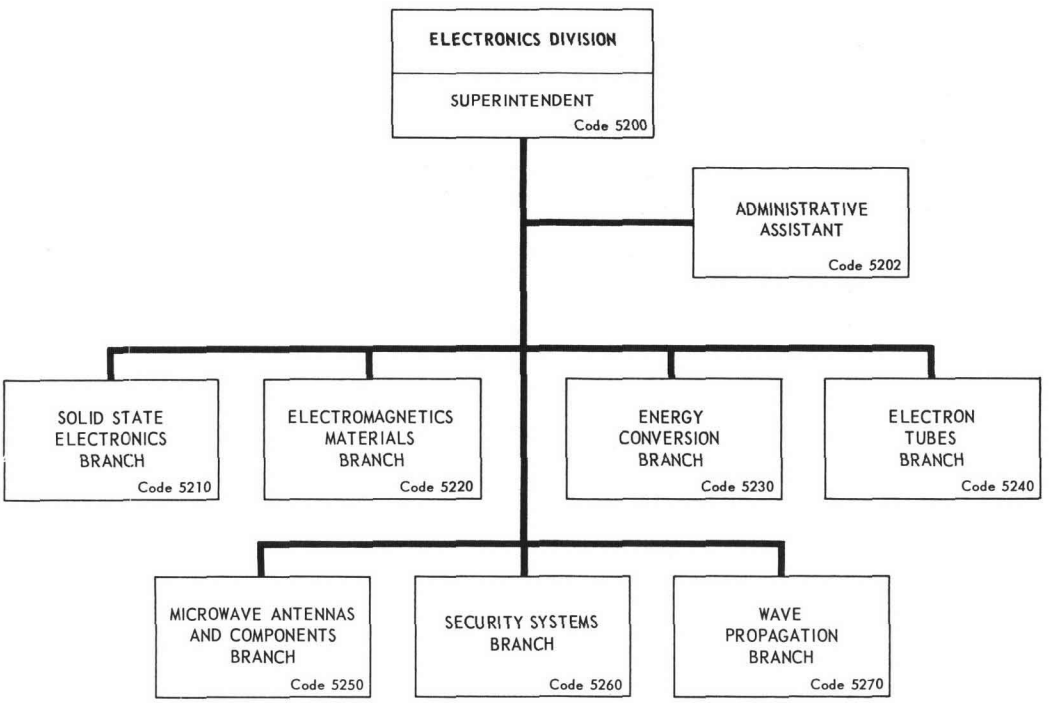


ELECTRON TUBE RESEARCH



ANTENNA RESEARCH

- SOLID STATE ELECTRONICS
- ENERGY CONVERSION
- ELECTRON TUBES
- MICROWAVE ANTENNAS
- SECURITY SYSTEMS
- WAVE PROPAGATION
- ELECTROMAGNETIC MATERIALS



BASIC RESPONSIBILITIES

The Electronics Division carries out programs of basic and applied research and development in the fields of: electronic properties of solid materials; energy conversion methods; microwave antennas and components; microelectronic technology; electronic identification systems; electromagnetic wave propagation; properties of ground and sea surface radar returns; and vacuum and gaseous electron devices.

BRANCHES

Solid State Electronics

- Electroluminescent semiconductor diodes
- Semiconductor device material
- Thin films
- Microwave semiconductor devices and circuits

Electromagnetic Materials

- Backscatter from surfaces and particles
- Determination of loss tangent characteristics of materials
- Radar protective coatings
- Advisory services on absorbent materials

Energy Conversion

- Advanced electric sources
- Energy processing for pulsed and low voltage
- Electric power and energy control

Electron Tubes

- Gas lasers
- Millimeter wave generation
- Vacuum breakdown
- Thermionics research

Microwave Antennas and Components

- Millimeter wave communication system
- Naval electronical scanning antennas for airborne use
- Advanced microwave antenna research
- Microwave electronic components

Security Systems

- Development of new IFF system
- Consulting services to AIMS* tri-service program
- Microminiaturization of electronic instrumentation
- Semiconductor devices and circuits
- Avigation research

Wave Propagation

- Properties of ground and sea surface radar echoes
- Meteorological phenomena and their effects

*AIMS
A - Air Traffic Control Radar Beacon
I - IFF (Identification Friend or Foe)
M - Mark XII
S - System

Key Personnel

Name	*Title*	*Grade*
Mr. A. Brodzinsky	Superintendent	PL 313
Mr. G. Abraham	Consultant	GS-13
Mr. T. E. Hanley	Head, Research Devices Facility	GS-14
Mr. A. C. Macpherson	Head, Solid State Electronics Branch	GS-15
Dr. R. W. Wright	Head, Electromagnetic Materials Branch	GS-15
Mr. B. J. Wilson	Head, Energy Conversion Branch	GS-15
Dr. S. T. Smith	Head, Electron Tubes Branch	GS-16
Dr. A. E. Marston	Head, Microwave Antennas and Components Branch	GS-15
Mr. C. V. Parker	Head, Security Systems Branch	GS-15
Mr. F. C. Macdonald	Head, Wave Propagation Branch	GS-15

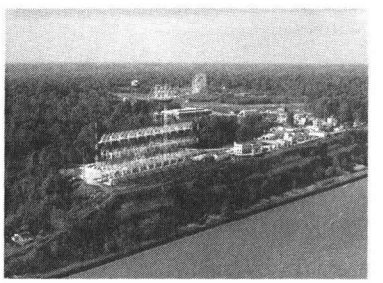
Personnel Complement

Ceiling: 150 On Board: 142

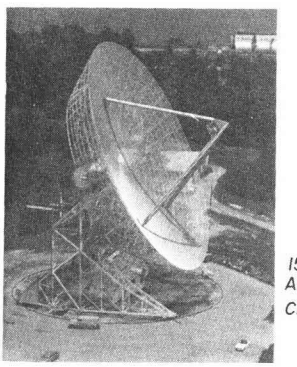
Total Estimated R&D Funding

Fiscal Year 1967: $3,514,000

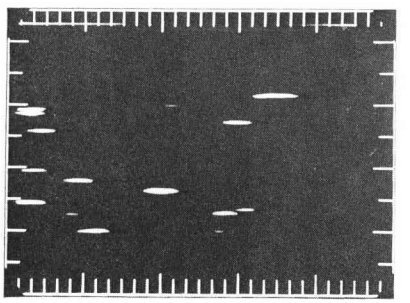
RADAR



LONG-RANGE RADAR ANTENNA

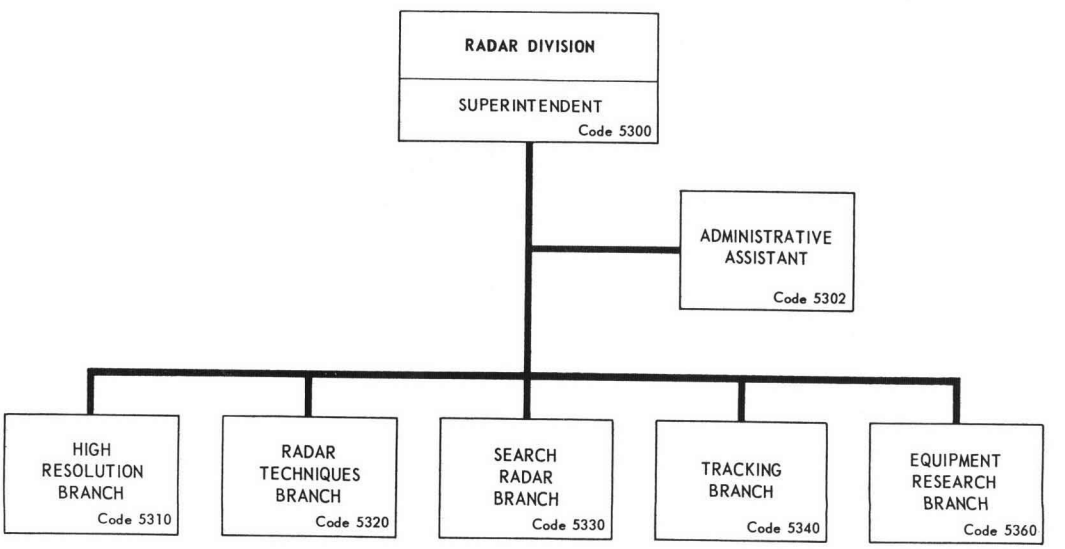


150 FOOT ANTENNA CBD



RADAR TARGETS

- HIGH RESOLUTION
- RADAR TECHNIQUES
- SEARCH RADAR
- TRACKING
- EQUIPMENT RESEARCH



BASIC RESPONSIBILITIES

The Radar Division conducts research and advanced development on new radar systems and techniques and investigates basic physical phenomena of importance to radar and related sensors. Systems analysis, evaluation of special radar systems, and consultative services also are provided.

BRANCHES

High Resolution

- High resolution techniques
- ASW radar
- Satellite radar
- Ocean surface effects

Radar Techniques

- High-frequency radar
- Signal processing
- Propagation through plasma

Search Radar

- Moving target indication techniques for ship and airborne radars
- Phased array techniques
- Studies of the ionosphere by means of radar and satellite transmissions
- Radar measurements of satellites and ballistic missiles
- AEW techniques and environmental studies

Tracking

- Radar target noise studies
- Precision tracking radar techniques
- Target signature analysis
- Microwave techniques
- Radar evaluation

Equipment Research

- Airborne intercept radar consultative services
- Radar and infrared counter-countermeasures
- Strategic deterrence support studies
- Secure command guidance
- Target radar-spectra studies
- Weapon system analysis

Mathematics Staff

- Signal processing theory
- Mathematical analysis

Key Personnel

Name	*Title*	*Grade*
Dr. M. I. Skolnik	Superintendent	PL 313
Mr. I. H. Page	Consultant	GS-16
Mr. S. F. George	Consultant	GS-15
Mr. C. H. Dodge	Consultant	GS-15
Mr. I. W. Fuller, Jr.	Head, High Resolution Branch	GS-15
Mr. F. M. Gager	Head, Radar Techniques Branch	GS-16
Dr. R. J. Adams	Head, Search Radar Branch	GS-15
Mr. J. H. Dunn	Head, Tracking Branch	GS-15
Mr. H. Gordon, Jr.	Head, Equipment Research Branch (Acting)	GS-15

Personnel Complement

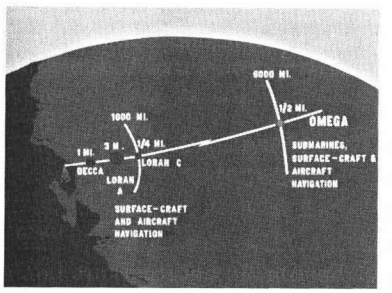
Ceiling: 163 On Board: 159

Total Estimated R&D Funding

Fiscal Year 1967: $7,052,000

RADIO

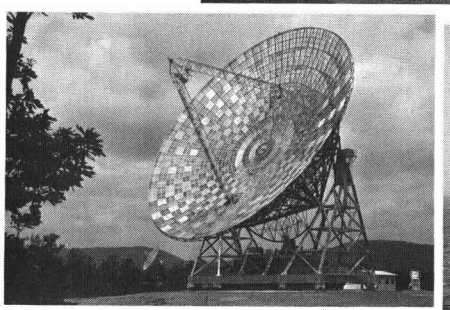
NAVIGATION SYSTEM

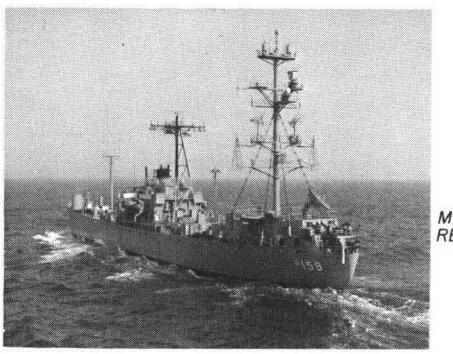


- COMMUNICATION
- RADIO TECHNIQUES
- COUNTERMEASURES
- RADIO NAVIGATION
- RADIO PHYSICS

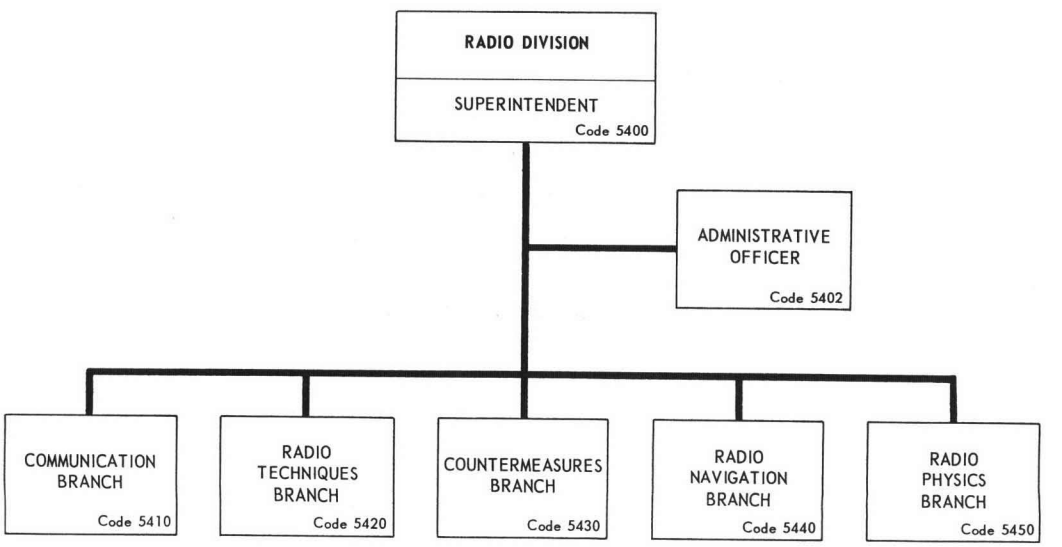
150 FOOT ANTENNA

Sugar Grove





MOON RELAY



BASIC RESPONSIBILITIES

The Radio Division conducts research and development in the fields of radio communication, radio navigation, radio countermeasures, radio propagation, precise frequency and time, centralized electronic control, and large parabolic antenna functions. Consultative services are a major division effort.

BRANCHES

Radio Communication

- Secure communication
- Crypto-logic systems
- Communication antennas and circuitry
- ELF-VLF and H.F. tropospheric propagation
- Facsimile, teletype, modem, and interface functions

Radio Techniques

- Satellite communication
- Precise frequency and time
- Centralized electronic control
- Radio channel certainty and spectral purity

Radio Countermeasures

- Interception
- Direction and position determination
- Signal processing, analysis, recording, and display
- Jamming
- Deception

Radio Navigation

- Long-range navigation
- Short-range and precise navigation
- TACAN
- Navigation security
- Underwater propagation and reception

Radio Physics

- Large parabolic antenna systems
- Electromagnetic radiation observation
- Special media propagation
- Electromagnetic exosphere phenomena
- National radio quiet zone

Key Personnel

Name	*Title*	*Grade*
Mr. L. A. Gebhard	Superintendent	
Mr. L. C. Young	Consultant	
Mr. C. B. Davis	Head, Communication Branch	GS-16
Mr. E. Toth	Head, Radio Techniques Branch	GS-16
Mr. H. O. Lorenzen	Head, Countermeasures Branch	PL 313
Dr. A. W. Coven	Head, Radio Navigation Branch	GS-15
Mr. J. H. Trexler	Head, Radio Physics Branch	GS-16

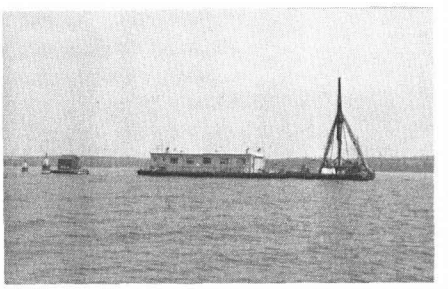
Personnel Complement

Ceiling		On Board	
Graded:	210	Graded:	192
Ungraded:	2	Ungraded:	2
Total:	212	Total:	194

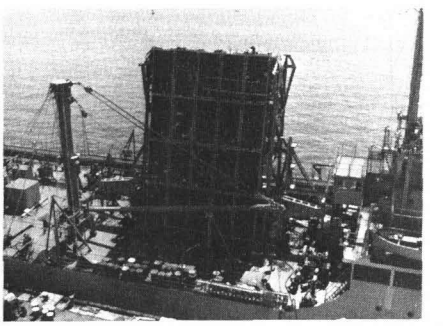
Total Estimated R&D Funding

Fiscal Year 1967: $12,350,000

SOUND

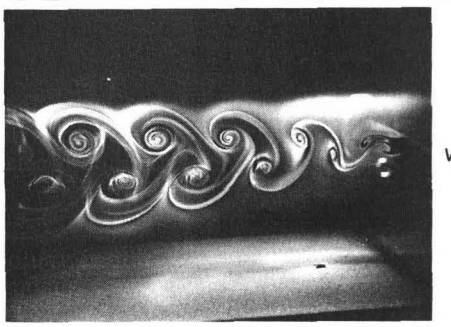


SENECA LAKE FACILITY

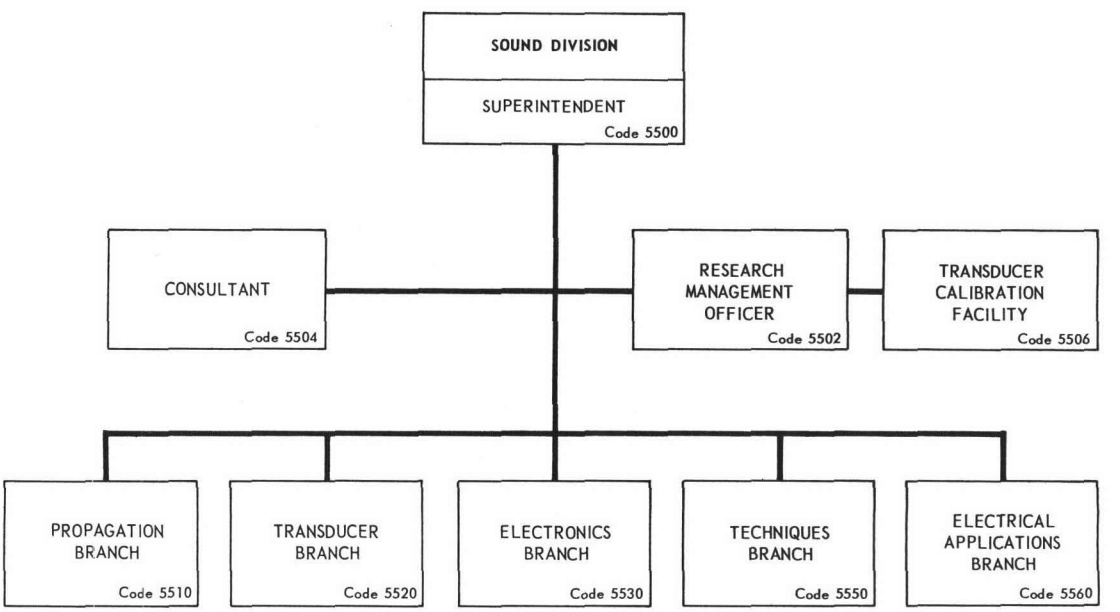


ARTEMIS TRANSDUCER ARRAY

- PROPAGATION
- TRANSDUCER
- ELECTRONICS
- TECHNIQUES
- ELECTRICAL APPLICATIONS



VORTEX STUDIES



BASIC RESPONSIBILITIES

The Sound Division conducts research in the generation and reception of underwater sound; investigates, over a wide range of frequencies, its intensity, velocity and absorption; and studies its refraction, reflection, scattering, and interference. From these studies, the Division designs, develops, and evaluates complete and integrated sonar systems for submarines, surface vessels, and aircraft to be used by the Navy in pro- and anti-submarine programs, harbor defense, acoustically controlled missiles, and countermeasures.

BRANCHES

Propagation

- Ocean sound propagation
- Microacoustics
- Flow acoustics
- Ultrasonics
- Sound recording

Transducer

- Basic radiation theory
- Electroacoustic modeling
- Transducer mathematical models
- Calibration of large transducer arrays

Electronics

- Signal processing
- Communication theory
- Data presentation

Techniques

- Acoustic countermeasure techniques
- Long-range attack
- Assured range studies
- Ocean surface effects from submarines

Electrical Applications

- Sound scattering in the ocean
- Sound speeds in the ocean
- ARTEMIS transducer array
- Sonar transmitter development
- Signal analysis
- Shallow water propagation

Key Personnel

Name	*Title*	*Grade*
Dr. H. L. Saxton	Superintendent	PL 313
Mr. H. R. Baker	Consultant	GS-14
Dr. R. L. Steinberger	Head, Propagation Branch	GS-15
Mr. S. Hanish	Head, Transducer Branch (Acting)	GS-14
Mr. W. J. Finney	Head, Electronics Branch	GS-15
Mr. R. H. Mathes	Head, Techniques Branch	GS-15
Mr. A. T. McClinton	Head, Electrical Applications Branch	GS-16

Personnel Complement

Ceiling		On Board	
Graded:	98	Graded:	96
Ungraded:	3	Ungraded:	3
Total:	101	Total:	99

Total Estimated R&D Funding

Fiscal Year 1967: $3,142,000

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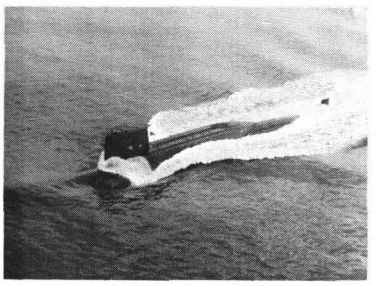
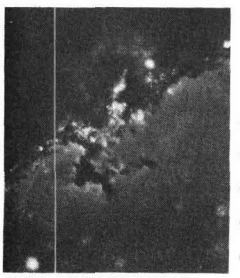
Materials Area

Associate Director of Research for Materials
Dr. R. L. Dolecek

CHEMISTRY

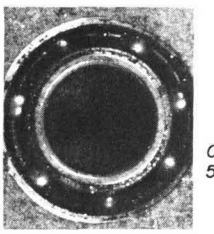


SUBMARINE HABITABILITY

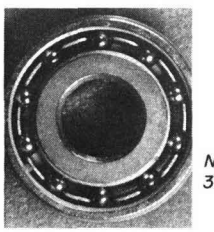


HIGH TEMPERATURE CORROSION

- PHYSICAL CHEMISTRY
- ORGANIC AND BIOLOGICAL CHEMISTRY
- INORGANIC AND NUCLEAR CHEMISTRY
- PROTECTIVE CHEMISTRY
- ELECTROCHEMISTRY
- SURFACE CHEMISTRY
- FUELS

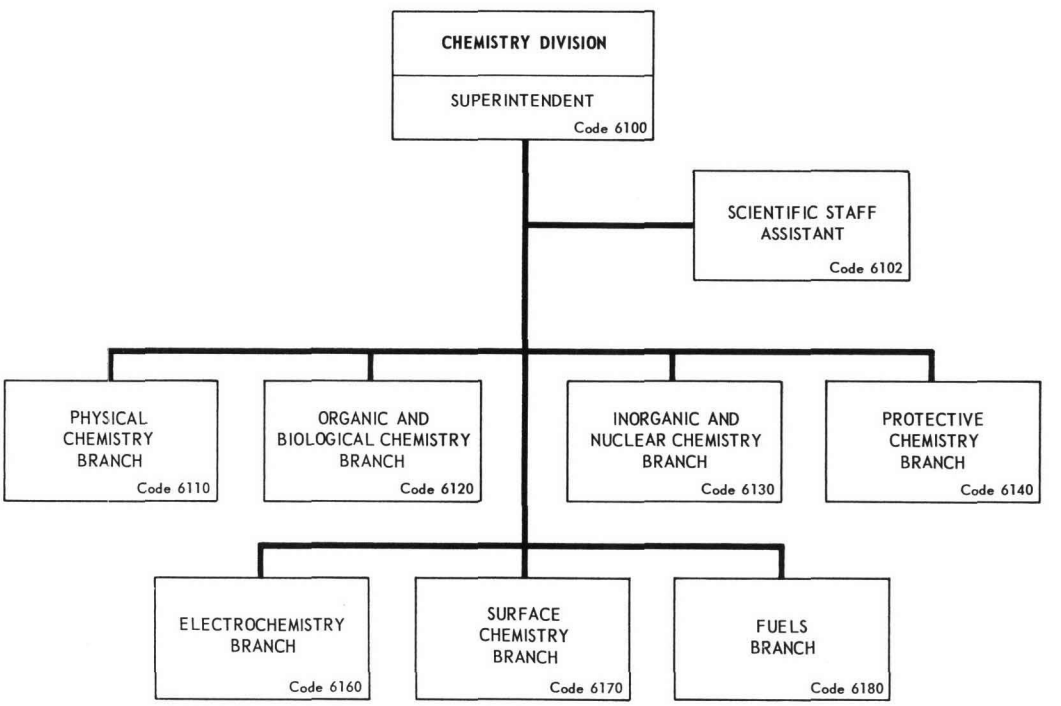


OLD SYSTEM 500 hrs.



NEW SYSTEM 3000 hrs.

BEARING LUBRICANTS



BASIC RESPONSIBILITIES

The Chemistry Division conducts a diversified program of basic and applied research and development in physical, organic, inorganic, nuclear, and biological chemistry. Specialized programs within these fields include fuels, lubricants, corrosion and surface protective coatings, polymers, electrochemistry, molecular structure, submarine atmosphere purification, and BW/CW personnel protection. Consultative services form an important element in the division effort.

BRANCHES

Physical Chemistry

- Atmospheric radioactivity
- Infrared and ultraviolet spectroscopy
- Analytical mass spectrometry
- Nuclear magnetic resonance spectroscopy

Organic and Biological Chemistry

- Microbiological research
- Functional organic coatings
- Properties of resins under high compressive loads

Inorganic and Nuclear Chemistry

- High temperature materials
- Submarine air purification
- Oxygen generating chemicals
- Corrosion mechanisms

Protective Chemistry

- CW/BW ship defense
- Adsorbents
- Properties of microbial surfaces

Electrochemistry

- Fuel cells
- Fundamental electrode reactions
- Electrochemical power sources
- Nuclear submarine atmosphere analysis and control

Surface Chemistry

- Lubricants
- Absorption-desorption equilibria
- Salvage of equipment damaged by sea water
- Surface properties of fibers

Fuels

- Organic contaminants in submarine atmosphere
- Distillate fuels research
- Liquid propellant properties

Key Personnel

Name	*Title*	*Grade*
Dr. W. A. Zisman	Superintendent	PL 313
Mr. K. W. Bewig	Consultant	GS-13
Mr. R. C. Taylor	Consultant	GS-13
Dr. M. C. Bloom	Consultant	GS-14
Dr. L. B. Lockhart, Jr.	Head, Physical Chemistry Branch	GS-15
Dr. A. L. Alexander	Head, Organic and Biological Chemistry Branch	GS-16
Mr. R. R. Miller	Head, Inorganic and Nuclear Chemistry Branch	GS-16
Dr. E. A. Ramskill	Head, Protective Chemistry Branch	GS-16
Dr. J. C. White	Head, Electrochemistry Branch	GS-15
Dr. C. R. Singleterry	Head, Surface Chemistry Branch	GS-15
Dr. H. W. Carhart	Head, Fuels Branch	GS-15

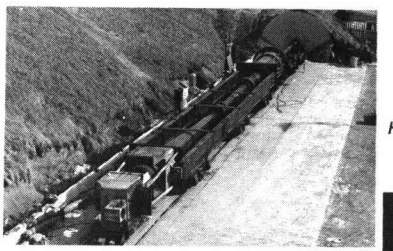
Personnel Complement

Ceiling: 126 On Board: 122

Total Estimated R&D Funding

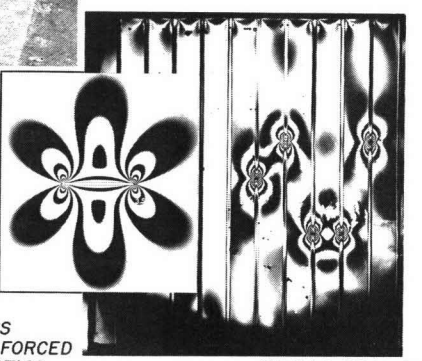
Fiscal Year 1967: $3,119,000

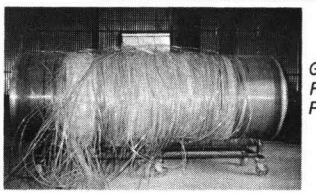
MECHANICS



HYPERVELOCITY GUN

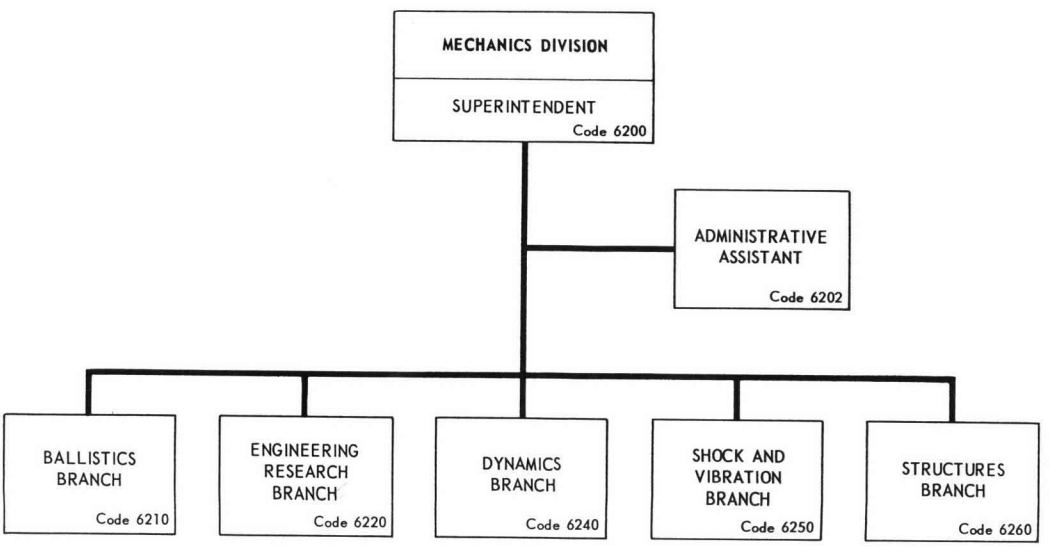
- BALLISTICS
- ENGINEERING RESEARCH
- DYNAMICS
- SHOCK AND VIBRATION
- STRUCTURES





GLASS REINFORCED PLASTICS

STRESS ANALYSIS



BASIC RESPONSIBILITIES

The Mechanics Division conducts basic and applied research in fracture and closely related fields including penetration ballistics, hypervelocity, structural design, shock and vibration, structural dynamics, and fire extinguishment. Emphasis is placed on the dynamic as opposed to the static approach to mechanical problems. Consultative services, not only to Navy but to all DOD agencies, form an important part of the division effort.

BRANCHES

Ballistics

- Fracture mechanics and fracture strength
- Plastic flowing
- Compression failure mechanisms in glass-reinforced plastics
- Armor research and development
- Deep submergence structures
- Missile component failure

Engineering Research

- Airplane crash fire fighting
- Combustion inhibition studies related to shipboard conditions
- Investigation of new oxidizers

Dynamics

- Vulnerability mechanics
- Hypervelocity kill mechanisms
- Hypervelocity mechanics
- Penetration into earthy materials

Shock and Vibration

- Shock strength of materials
- Shock propagation and instrumentation
- Nondestructive testing

Structures

- Shipboard shock fundamentals
- Shock protection for weapons systems
- Methods for design against shock
- Fracture mechanics design studies

Key Personnel

Name	*Title*	*Grade*
Dr. G. R. Irwin	Superintendent	PL 313
Dr. W. H. Sanders	Associate Superintendent	GS-14
Dr. A. V. H. Masket	Consultant	GS-15
Dr. Henri Marcus	Consultant	GS-15
Mr. J. A. Kies	Head, Ballistics Branch	GS-15
Dr. R. L. Tuve	Head, Engineering Research Branch	GS-15
Mr. W. W. Atkins	Head, Dynamics Branch	GS-15
Dr. I. Vigness	Head, Shock and Vibration Branch	GS-16
Dr. R. O. Belsheim	Head, Structures Branch	GS-15

Personnel Complement

Ceiling: 92 On Board: 89

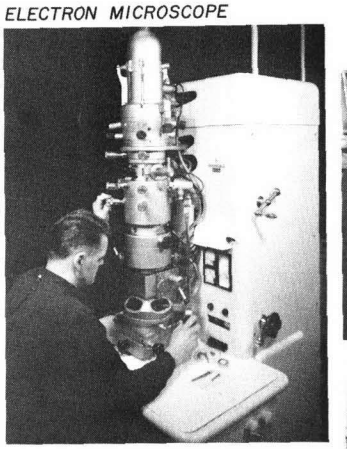
Total Estimated R&D Funding

Fiscal Year 1967: $8,117,000

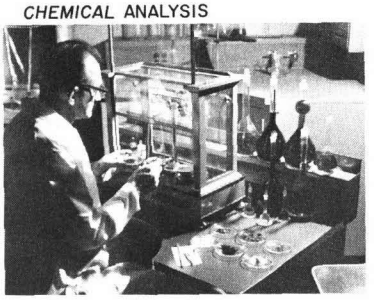
METALLURGY

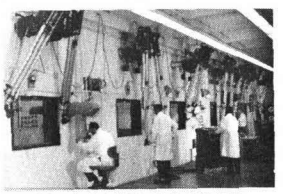
- PHYSICAL METALLURGY
- METAL PHYSICS
- HIGH TEMPERATURE ALLOYS
- WELDING METALLURGY
- ANALYTICAL CHEMISTRY
- STRENGTH OF METALS
- REACTOR MATERIALS

ELECTRON MICROSCOPE



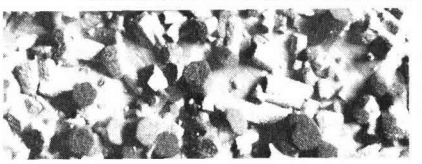
CHEMICAL ANALYSIS

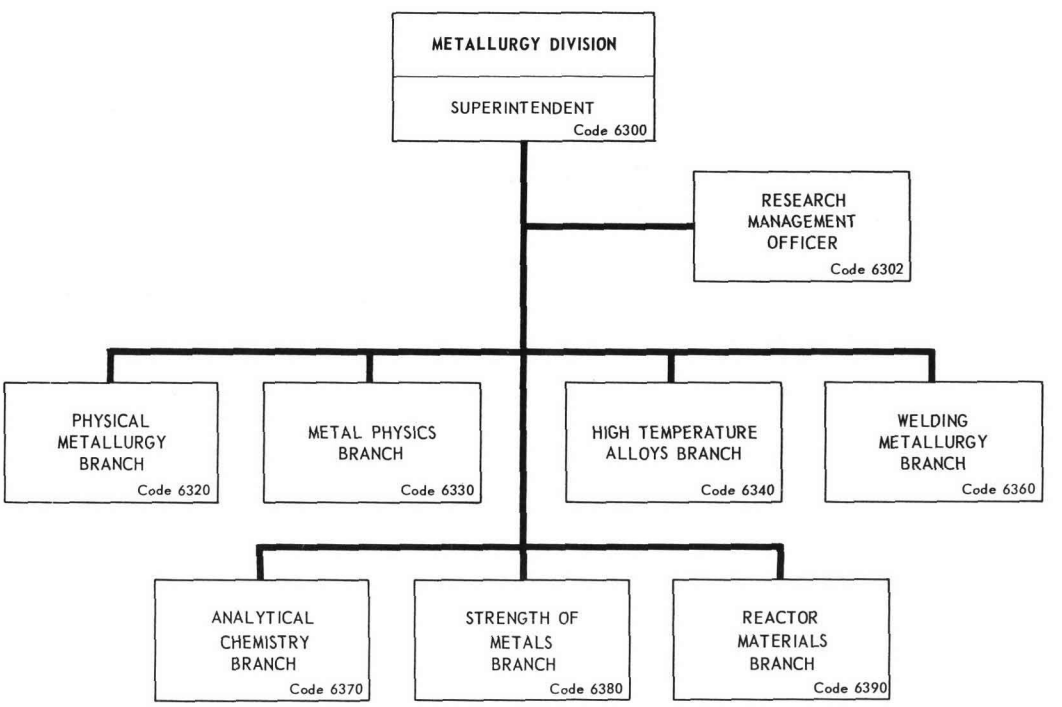




REMOTE HANDLING ROOM

CORUNDUM CRYSTALS





BASIC RESPONSIBILITIES

The Metallurgy Division conducts research, development, and evaluation in the field of metallurgy, including the physical, mechanical, chemical, and structural aspects of metals. Important consultative services are provided to Navy and other DOD activities.

BRANCHES

Physical Metallurgy

- Physical metallurgy of high-temperature materials
- Micromechanical metallurgy
- Failure analysis
- Marine corrosion studies

Metal Physics

- Crystal growth in metals
- Properties of metals in liquid state
- Growth of high-purity single crystals
- Metallurgy of metallic alloys
- Effects of irradiation upon the solid state properties of metals

High-Temperature Alloys

- Flow and fracture
- High-temperature strength
- Effects of environment on fatigue strength

Welding Metallurgy

- Weld joint behavior
- Development of test methods
- Relationships between flaw size, temperature, and stress level for structural design

Analytical Chemistry

- Precision chemical analysis
- Analytical techniques development
- Determination of trace quantities of elements in small samples

Strength of Metals

- Properties, selection criteria, and fracture-safe design parameters for ultra-high-strength structural metals

Reactor Materials

- Properties of irradiated structural metals and alloys
- Mechanisms of radiation degradation of metals
- Engineering application of reactor materials
- Neutron spectra and dosimetry

Key Personnel

Name	*Title*	*Grade*
Mr. W. S. Pellini	Superintendent	PL 313
Dr. B. F. Brown	Head, Physical Metallurgy Branch	GS-16
Dr. M. E. Glicksman	Head, Metal Physics Branch (Acting)	GS-13
Dr. M. R. Achter	Head, High Temperature Alloys Branch	GS-15
Mr. E. J. Chapin	Consultant	GS-15
Dr. P. P. Puzak	Head, Welding Metallurgy Branch	GS-14
Mr. D. I. Walter	Head, Analytical Chemistry Branch	GS-15
Mr. R. J. Goode	Head, Strength of Metals Branch (Acting)	GS-14
Mr. L. E. Steele	Head, Reactor Materials Branch	GS-15

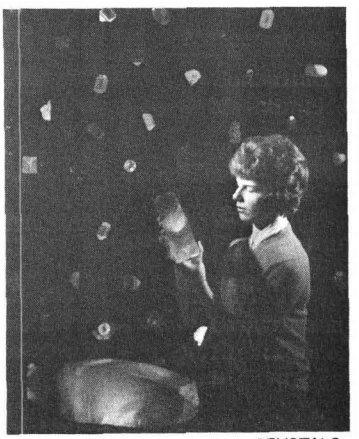
Personnel Complement

Ceiling: 100 On Board: 100

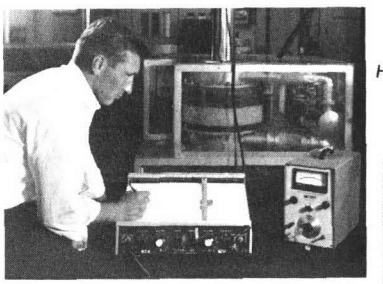
Total Estimated R&D Funding

Fiscal Year 1967: $3,191,000

SOLID STATE

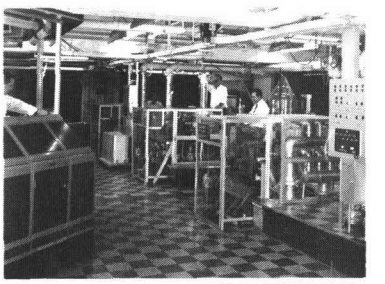


CRYSTALS

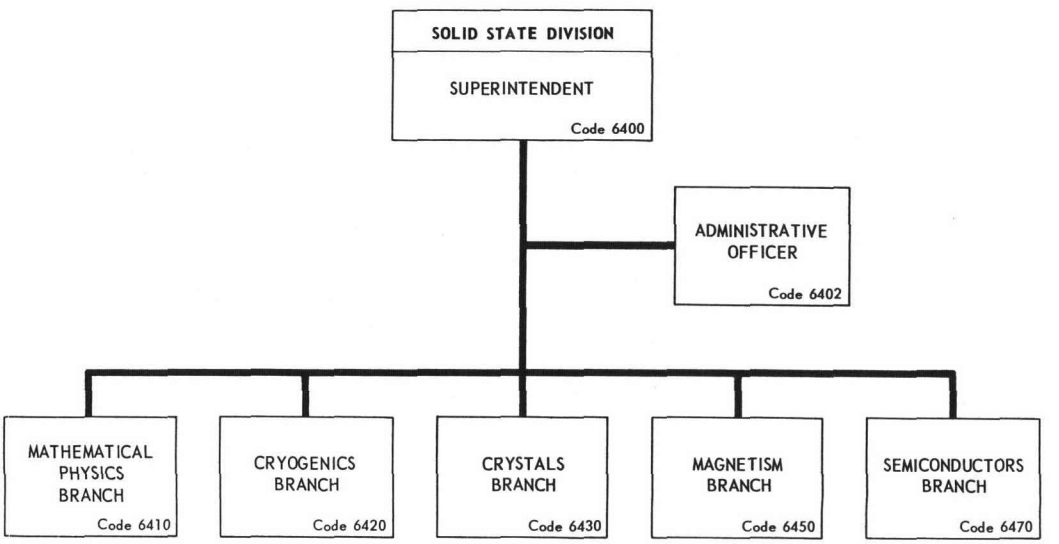


HIGH MAGNETIC FACILITY

- CRYOGENICS
- CRYSTALS
- MAGNETISM
- MATHEMATICAL PHYSICS
- SEMICONDUCTORS



CRYOMAGNETICS



BASIC RESPONSIBILITIES

The Solid State Division is concerned with fundamental and applied research in the physics of materials, principally solids. Included are studies of the properties and applications of semiconductors and of magnetic and paramagnetic materials; of the growth and structure of solids; and of cryogenics. The purpose is an increased understanding of the physical properties and structure of matter and the relationships governing its behavior and the application of this knowledge to military and industrial problems.

BRANCHES

Mathematical Physics

- Consultative mathematical services
- Mathematical concepts of physical phenomena

Cryogenics

- Cryomagnetism
- Cryogenic properties of matter
- Physical investigations of nonmetallic solids

Crystals

- Growth and structure of crystals
- Electromagnetic ceramics
- High-pressure effects

Magnetism

- Electronic and nuclear paramagnetism
- Spin-ordered magnetic phenomena

Semiconductor

- Electronic energy levels and band structure
- Semiconductor applications
- Physical properties of semiconductors

Key Personnel

Name	*Title*	*Grade*
Dr. J. deLaunay	Superintendent	PL 313
Dr. M. F. M. Osborne	Consultant	GS-15
Dr. H. Hauptman	Head, Mathematical Physics Branch	GS-15
Mr. J. R. Clement	Head, Cryogenics Branch	GS-15
Dr. P. B. Alers	Head, Crystals Branch (Acting)	GS-14
Dr. G. T. Rado	Head, Magnetism Branch	GS-16
Dr. R. F. Wallis	Head, Semiconductors Branch	GS-15

Personnel Complement

Ceiling: 79 On Board: 75

Total Estimated R&D Funding

Fiscal Year 1967: $2,030,000

SPECIAL CENTERS

RESEARCH COMPUTATION CENTER
BASIC RESPONSIBILITIES

The Research Computation Center provides and operates general purpose computers (both analog and digital) for NRL, including the conversion of field-collected data to a form suitable for processing. The Center advises all divisions on data collection and processing and conducts research in data processing techniques.

Key Personnel

Name	*Title*	*Grade*
Mr. A. B. Bligh	Head, Research Computation Center Head, Programming Section	GS-15
Mr. I. J. Levy	Head, Data Engineering & Operations Section	GS-14
Mr. W. P. DeWitt	Head, Analog Computer Section	GS-13
Mr. R. M. Mason	Head, Mathematical Consulting Section	GS-13
Dr. J. W. Kallander	Head, Programming Systems Section	GS-13

Personnel Complement

Ceiling: 42 On Board: 39

Total Estimated R&D Funding

Fiscal Year 1967: $330,000

SHOCK & VIBRATION INFORMATION CENTER
BASIC RESPONSIBILITIES

The Shock & Vibration Information Center is one of the information centers established by the Director of Technical Information, DDR&E. It provides a single source within the Department of Defense for up-to-date information in the fields of shock and vibration for scientists and engineers in government agencies and for government contractors.

Key Personnel

Name	*Title*	*Grade*
Dr. W. W. Mutch	Head, S&V Information Center	GS-15

Personnel Complement

Ceiling: 6 On Board: 5

Total Estimated R&D Funding

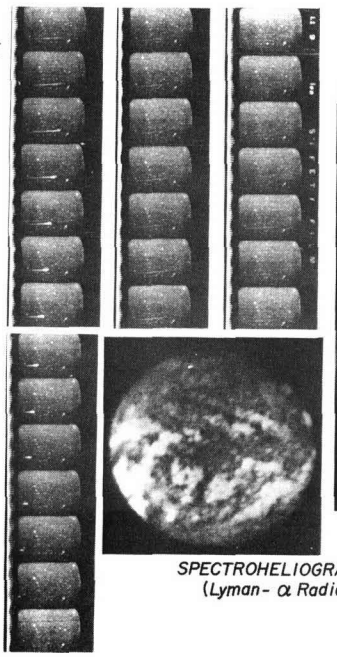
Fiscal Year 1967: $275,000

General Sciences Area

Associate Director of Research for General Sciences
Dr. W. C. Hall

ATMOSPHERE AND ASTROPHYSICS

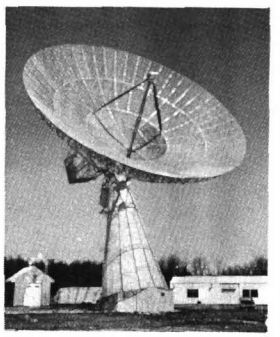
METEORITE STUDIES



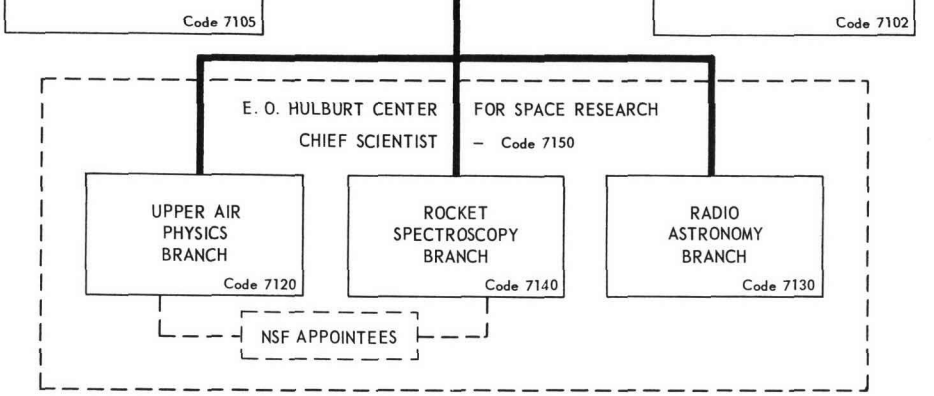
SOLRAD

UPPER AIR PHYSICS
RADIO ASTRONOMY
ROCKET SPECTROSCOPY
E. O. HULBURT CENTER

RADIO TELESCOPE
MARYLAND POINT



SPECTROHELIOGRAM
(Lyman- α Radiation)



BASIC RESPONSIBILITIES

The Atmosphere and Astrophysics Division conducts research, development, and test in the fields of upper air physics and astrophysics. Satellites and rockets are used to obtain information on radiation incident on the ionosphere and on its composition and behavior. Radio telescopes are used to study incident radiation in the radio-frequency spectrum. Results are of importance to radio communications, to space travel, and to the understanding of solar emissions.

BRANCHES

Upper Air Physics

Solar x-ray photometry
Aeronomy
Research satellites and sounding rockets

Radio Astronomy

Galactic and extra-galactic radio astronomy
Radar measurements of earth-mood distance and topography of moon

Rocket Spectroscopy

Spectroheliographic and coronagraphic research
Airglow photography from manned spacecraft

E.O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and post-graduate students and visiting faculty members to cooperate with NRL in space research.

Key Personnel

Name	*Title*	*Grade or Rank*
Dr. H. Friedman	Superintendent	PL 313
Mr. R. C. Meyer	Engineering Consultant	GS-14
D. R. Mayer	Scientific Liaison Officer	CDR, USN
Dr. T. A. Chubb	Head, Upper Air Physics Branch	PL 313
Mr. E. F. McClain	Head, Radio Astronomy Branch	GS-16
Dr. R. Tousey	Head, Rocket Spectroscopy Branch	PL 313
Dr. H. Friedman	Chief Scientist, Hulburt Center	PL 313

Personnel Complement

Ceiling: 118 On Board: 114

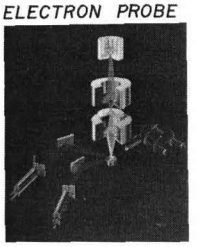
Total Estimated R&D Funding

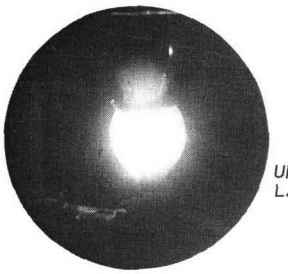
Fiscal Year 1967: $10,469,000

OPTICAL PHYSICS

- RADIOMETRY
- X-RAY OPTICS
- OPTICAL MATERIALS
- DIFFRACTION

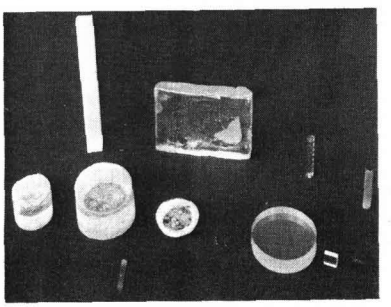
ELECTRON PROBE

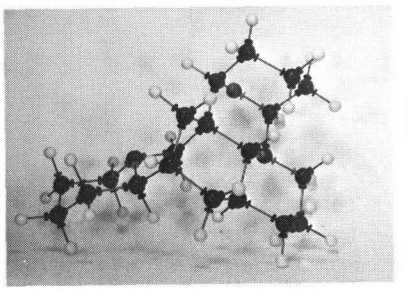




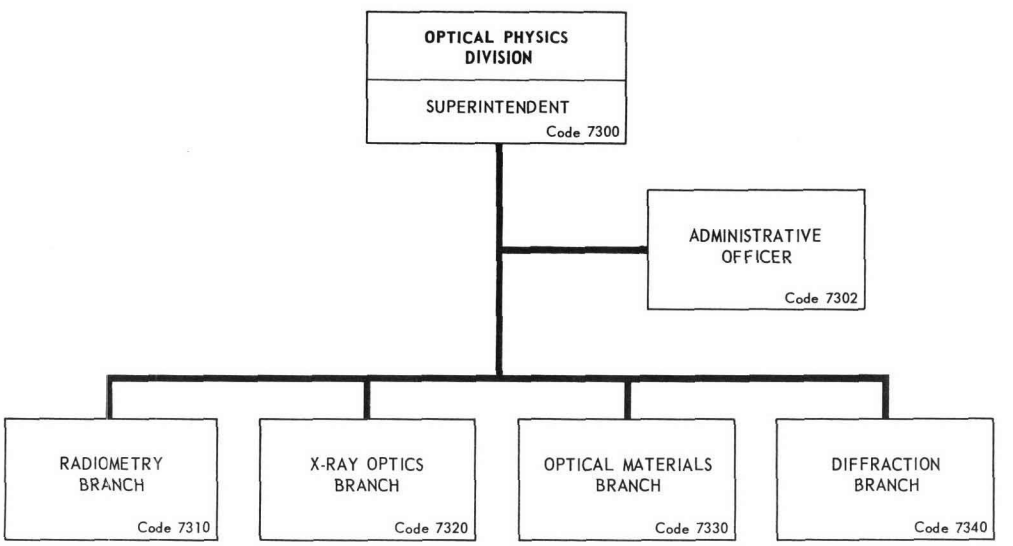
UNDERWATER LAMP

LUMINESCENT PROPERTIES OF GLASS





CRYSTAL STRUCTURE



BASIC RESPONSIBILITIES

The Optical Physics Division conducts basic and applied investigations which deal, in a broad sense, with the interaction of matter and radiation in the x-ray, ultraviolet, visible, and infrared regions of the electromagnetic spectrum. Studies include: production, control, and propagation of coherent radiation (laser physics); fundamental studies of luminescence and radiation damage phenomena and of luminescent materials, particularly solids; the absorption and scattering of optical radiations by various targets; visibility problems; atmospheric absorption and light propagation through the atmosphere; hydrological optics; optical communications; high-speed spectroscopy; development of x-ray and electron diffraction methods for structural and compositional analysis; and x-ray spectroscopy.

BRANCHES

Radiometry

- Scattering and twinkle of light
- Lasers
- Undersea optics
- Optical properties of materials, the atmosphere, and the ocean

X-Ray Optics

- X-ray and electron optics
- Nondestructive analysis

Optical Materials

- Optical and radiation-sensitive properties of nonmetallic materials
- Color centers
- Thermoluminescence
- Lasers

Diffraction

- Electron and x-ray diffraction
- Crystal structure
- Theory

Key Personnel

Name	*Title*	*Grade*
Dr. J. H. Schulman	Superintendent	PL 313
Mr. G. L. Harvey	Consultant	GS-15
Dr. L. F. Drummeter, Jr.	Head, Radiometry Branch	GS-16
Mr. L. S. Birks	Head, X-Ray Optics Branch	GS-16
Dr. C. C. Klick	Head, Optical Materials Branch (Acting)	GS-16
Dr. J. Karle	Head, Diffraction Branch	GS-16

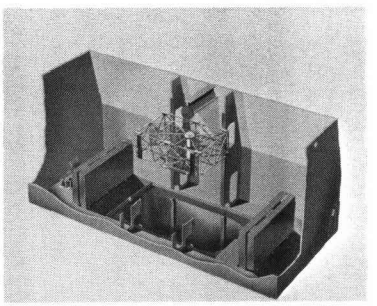
Personnel Complement

Ceiling: 63 On Board: 63

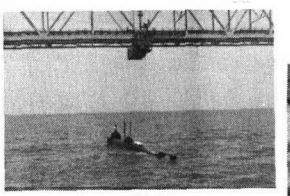
Total Estimated R&D Funding

Fiscal Year 1967: $2,052,000

OCEAN SCIENCES AND ENGINEERING

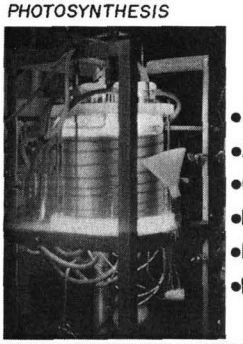


CENTERWELL (MIZAR)

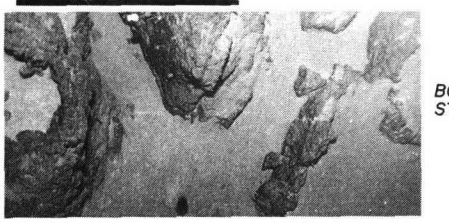


SURFACE EFFECTS

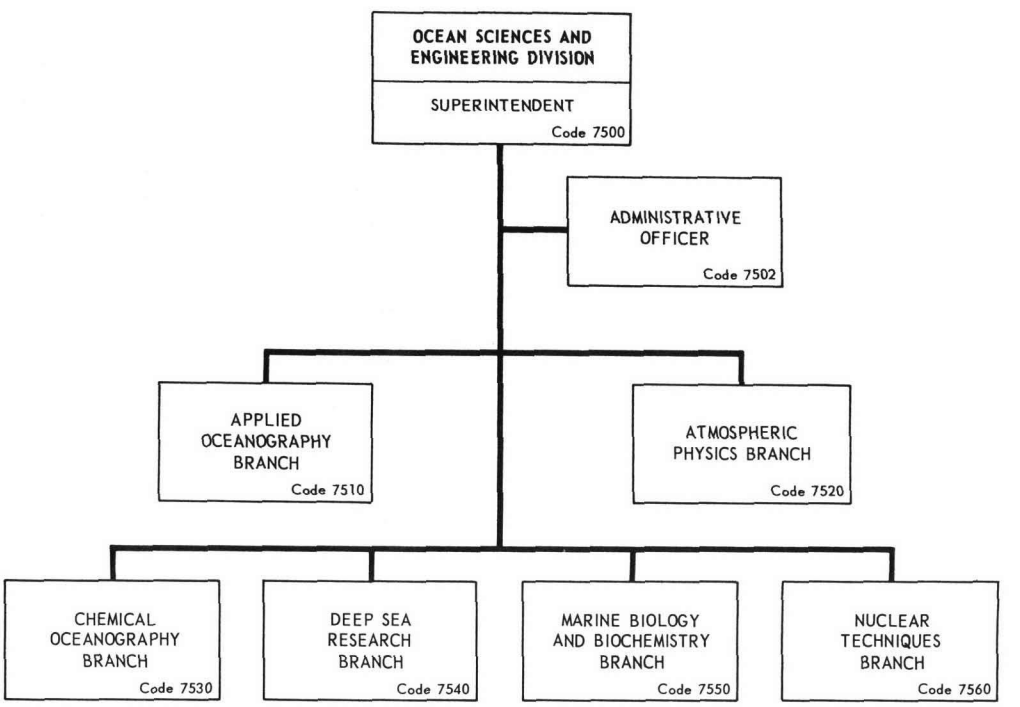
PHOTOSYNTHESIS



- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- DEEP SEA RESEARCH
- MARINE BIOLOGY AND BIOCHEMISTRY
- NUCLEAR TECHNIQUES



BOTTOM STUDIES



BASIC RESPONSIBILITIES

The Ocean Sciences and Engineering Division conducts basic and applied research and development in the ocean sciences. Included are studies of the physics, chemistry, geology, and biology of the oceans and of engineering applications directed toward an improved understanding and use of the oceans as the major operating environment of the Navy. Practical results lead ultimately to improvement in the design and effectiveness of naval equipment, materials, and systems.

BRANCHES

Applied Oceanography

- Nonacoustic detection of submarines
- Hydrodynamics of submerged bodies
- Infrared characteristics of the ocean

Atmospheric Physics

- Interactions between the atmosphere and the ocean
- Dynamics of the atmosphere
- Physics of clouds
- Weather instrumentation

Chemical Oceanography

- Physical and analytical chemistry of sea water, dissolved gases, and marine sediments

Deep-Sea Research

- Deep-ocean instrumentation and investigations
- Hydrodynamics of deep towing
- Reliable acoustic paths

Marine Biology and Biochemistry

- Plankton physiology and biochemistry
- Surface chemistry of the ocean
- Marine environments

Nuclear Techniques

- Determination of trace elements in the ocean, the ocean sediments, and the atmosphere

Key Personnel

Name	*Title*	*Grade*
Dr. V. J. Linnenbom	Superintendent (Acting)	GS-16
Mr. H. L. Clark	Head, Applied Oceanography Branch	GS-16
Dr. J. E. Dinger	Head, Atmospheric Physics Branch	GS-16
Dr. C. H. Cheek	Head, Chemical Oceanography Branch (Acting)	GS-14
Dr. C. L. Buchanan	Head, Deep-Sea Research Branch	GS-15
Dr. J. M. Leonard	Head, Marine Biology and Biochemistry Branch	GS-15
Mr. J. I. Hoover	Head, Nuclear Techniques Branch (Acting)	GS-16

Personnel Complement

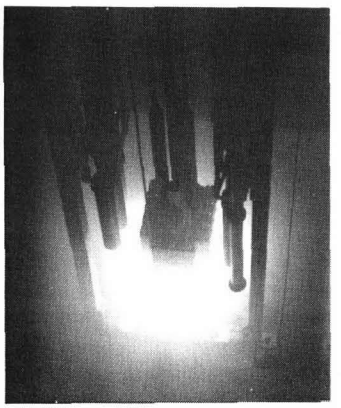
Ceiling: 100 On Board: 96

Total Estimated R&D Funding

Fiscal Year 1967: $4,138,000

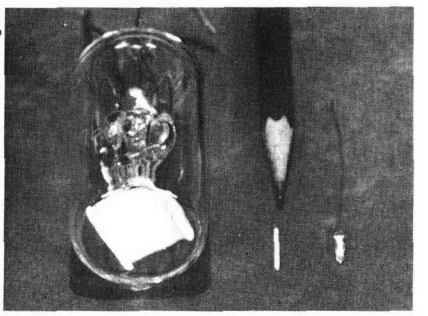
NUCLEAR PHYSICS

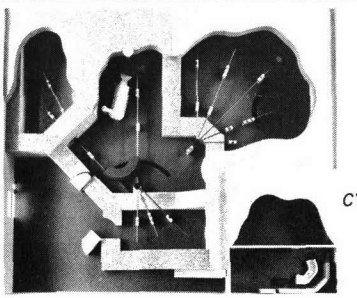
- CYCLOTRON
- DOSIMETRY
- LINAC
- NUCLEAR SYSTEMS
- REACTORS
- THEORY
- VAN DE GRAAFF



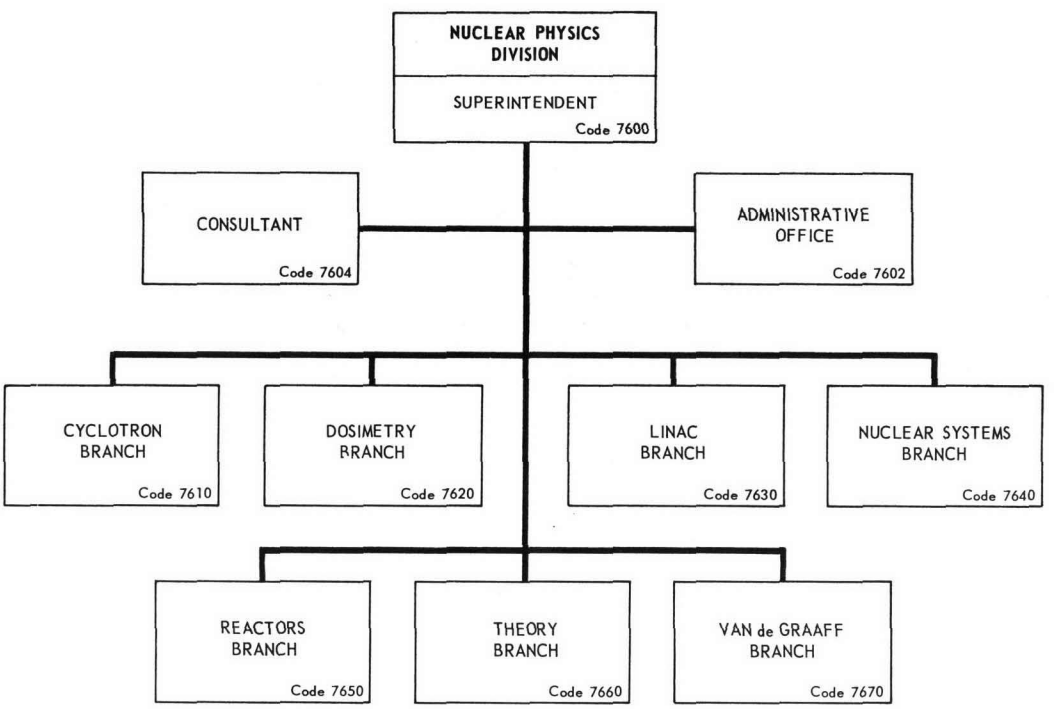
REACTOR CORE

DOSIMETER





CYCLOTRON



BASIC RESPONSIBILITIES

The Nuclear Physics Division is engaged in a broad program of basic and applied research in nuclear physics and related areas. Included are theoretical and experimental programs in properties of nuclei, nuclear forces, nuclear reactions, shielding studies, and weapon-related research. The Division employs the NRL 75 MeV sector focussing cyclotron, 60 MeV Linac, 1 megawatt reactor, and other particle accelerators and radiation sources.

BRANCHES

Cyclotron

- Low-energy nuclear physics
- Nuclear reaction mechanisms
- Particle scattering
- Materials irradiation

Dosimetry

- Dosimetry
- Thermoluminescence dosimetry
- Energy dependence of thermoluminescent materials

Linac

- Elastic and inelastic particle scattering
- Neutron capture
- Effects of particle bombardment

Nuclear Systems

- Low-level nuclear radiation detectors for special purposes

Reactors

- Operation and Development of NRL 1 megawatt reactor
- Neutron activation analysis
- Neutron diffraction

Theory

- Theory of nuclear reactions
- Field theory
- Elementary-particle physics
- Nuclear structure and reactions

Van de Graaff

- Nuclear structure physics
- Low-energy nuclear physics
- Precise nuclear energy determinations

Key Personnel

Name	*Title*	*Grade*
Dr. J. McElhinney	Superintendent (Acting)	GS-16
Dr. C. V. Strain	Consultant	GS-15
Dr. R. O. Bondelid	Head, Cyclotron Branch	GS-15
Mr. F. H. Attix	Head, Dosimetry Branch	GS-15
Dr. T. F. Godlove	Head, Linac Branch (Acting)	GS-14
Mr. D. C. Cook	Head, Nuclear Systems Branch	GS-16
Mr. K. W. Marlow	Head, Reactors Branch (Acting)	GS-13
Dr. A. W. Sáenz	Head, Theory Branch	GS-15
Mr. K. L. Dunning	Head, Van de Graaff Branch	GS-16

Personnel Complement

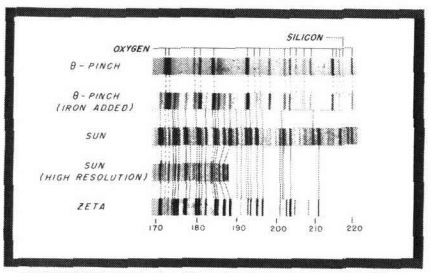
Ceiling: 113 On Board: 111

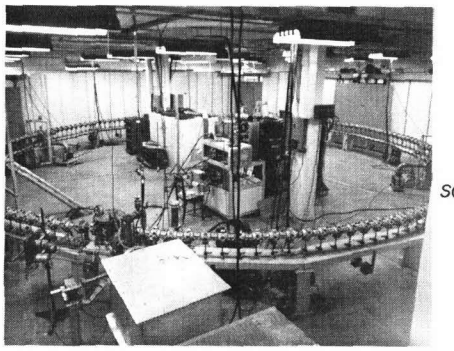
Total Estimated R&D Funding

Fiscal Year 1967: $3,231,000

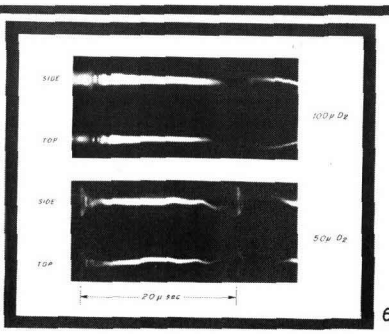
PLASMA PHYSICS

STAR vs. LAB SPECTRA



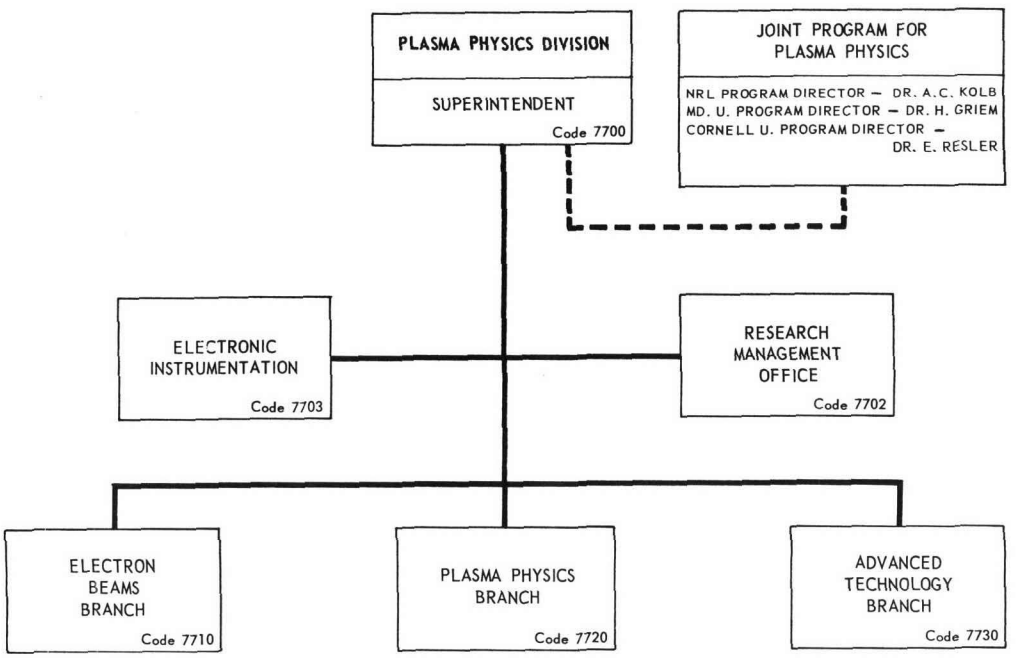


SOZOTRON



θ-PINCH EXPERIMENT

- ELECTRON BEAMS
- PLASMA PHYSICS



BASIC RESPONSIBILITIES

The Plasma Physics Division conducts both basic and applied research. Examples of effort underway in the field of plasma physics includes: fusion physics and the generation and containment of high-temperature plasmas, both directed toward eventual power sources; laboratory astrophysics; electron beams; and high-power lasers.

The Plasma Physics Division, the University of Maryland, and Cornell University engage in a formal joint program for plasma physics having as its primary objectives the pursuit of fundamental research in the field of extreme high-temperature studies and the advancement of the state-of-the-art in plasma physics.

BRANCHES

Electron Beams

Production and applications of intense electron beam
Beam stabilization

Plasma Physics

Physics and utilization of ultra-high-temperature plasmas
Nonlinear optics

Advanced Technology

Technological support to the Division in the form of electrical, mechanical, optical, and vacuum systems

Electronic Instrumentation

Instrumentation support to the Division for control measurement of experiments

Key Personnel

Name	*Title*	*Grade*
Dr. A. C. Kolb	Superintendent (Acting)	GS-15
Mr. D. C. dePackh	Head, Electron Beams Branch	GS-15
Dr. A. C. Kolb	Head, Plasma Physics Branch	GS-15
Dr. W. A. Lupton	Head, Advanced Technology Branch	GS-14
Mr. J. D. Shipman	Head, Electronic Instrumentation Branch	GS-15

Personnel Complement

Ceiling: 39 On Board: 32

Total Estimated R&D Funding

Fiscal Year 1967: $2,765,000

SPECIAL GROUPS

NONACOUSTIC ASW R&D TASK GROUP

BASIC RESPONSIBILITIES

The Nonacoustic ASW R&D Task Group coordinates the Navy's program for nonacoustic anti-submarine warfare research and development and provides means of making available all state-of-the-art knowledge.

Key Personnel

Name	*Title*	*Grade*
Dr. J. O. Elliot	Director, Nonacoustic ASW R&D Task Group	GS-15

Personnel Complement

Ceiling: 5 On Board: 3

Total Estimated R&D Funding

Fiscal Year 1967: $688,000

LABORATORY FOR COSMIC RAY PHYSICS

BASIC RESPONSIBILITIES

The Laboratory for Cosmic Ray Physics conducts a program of fundamental investigations of the cosmic radiation – its composition and spectra, its origin, its "age," its propagation through space, its interactions with particles and fields in the regions of space that it traverses, and its role in various high-energy astrophysical phenomena. The program is framed so as to be broadly responsive to the anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

Name	*Title*	*Grade*
Dr. M. M. Shapiro	Chief Scientist	PL 313
Mr. B. Stiller	Head, Emulsion Techniques Section	GS-14
Mr. N. Seeman	Head, Counter Techniques Section	GS-14

Personnel Complement

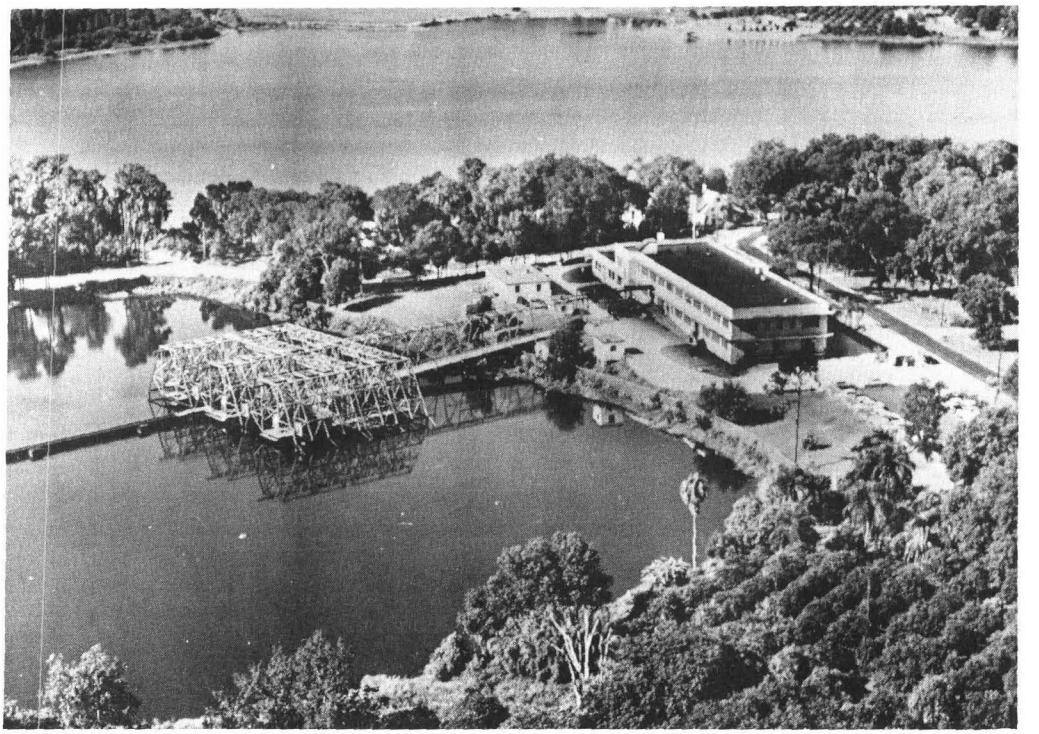
Ceiling: 23 On Board: 19

Total Estimated R&D Funding

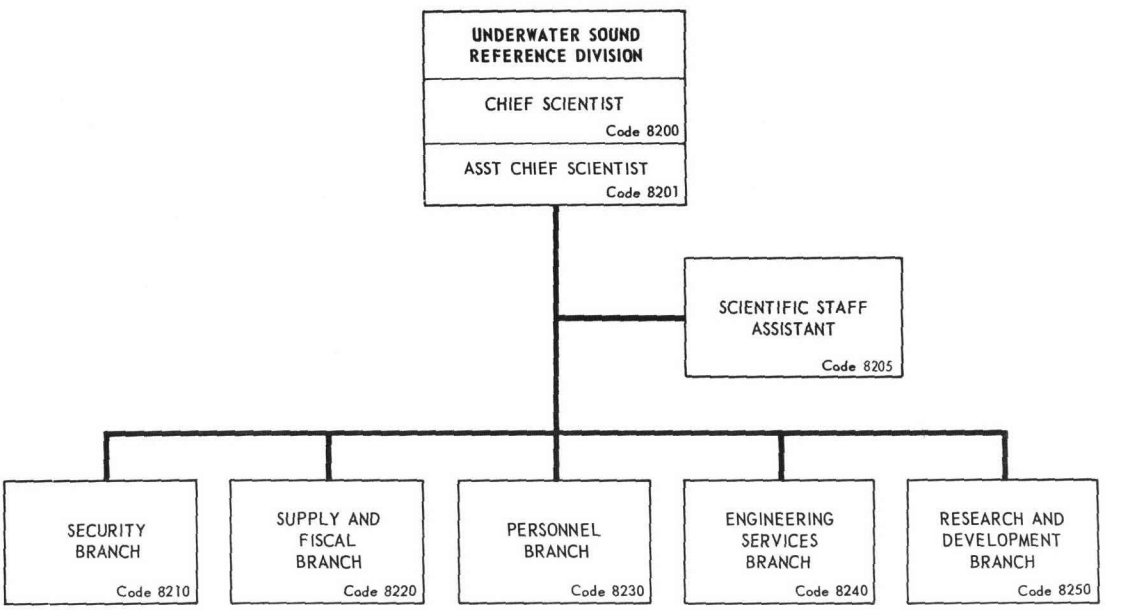
Fiscal Year 1967: $625,000

Underwater Sound Reference Division

The Underwater Sound Reference Laboratory, at Orlando, Florida, became the Underwater Sound Reference Division of NRL on July 1, 1966. In most cases, the statistical data for this division is not included in the over-all totals.



Aerial view of Underwater Sound Reference Division
Orlando, Florida



BASIC RESPONSIBILITIES

The Underwater Sound Reference Division is engaged in a program of research and development in the field of underwater acoustics. Specialized programs include acoustical measurement theory, methods, and systems; development of measuring techniques and instrumentation; and development of electro-acoustic transducers. It provides primary reference calibration services for underwater acoustic devices and equipment. It also provides consultative services to government agencies and contractors engaged in underwater sound research and development.

RESEARCH SECTIONS (Within R&D Branch)

Acoustic Calibration

- Open-water calibration
- Calibration techniques
- Data reduction

Research

- Acoustical measurement theory
- Mathematical physics

Electronics Engineering

- Measuring and recording systems
- Electronic equipment calibration

Transducer

- Acoustic materials research
- Standard transducer design and maintenance

Key Personnel

Name	*Title*	*Grade or Rank*
Mr. O. M. Owsley	Chief Scientist	PL 313
Mr. D. T. Hawley	Assistant Chief Scientist	GS-15
Mr. J. M. Taylor	Scientific Staff Assistant	GS-14
B. P. Peters	Head, Security Branch	LT, USN
Mr. J. C. Michael	Head, Supply and Fiscal Branch	GS-9
Mrs. M. K. Johnson	Head, Personnel Branch	GS-11
Mr. W. L. Paine	Asst R&D Branch Head for Operations	GS-14
Mr. W. J. Trott	Head, Research and Development Branch	GS-15
Mr. J. F. Prandoni	Head, Engineering Services Branch	GS-13

Personnel Complement

Ceiling		On Board	
Graded:	79	Graded:	80
Ungraded:	22	Ungraded:	21
Military:	1	Military:	1
	102		102

Total Estimated R&D Funding

Fiscal Year 1967: $1,193,000

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Support Services

Support Services

The Director of Support Services is a Naval Officer with the appropriate rank, training, and experience. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required in support of the work of the Research Department.

Key Personnel

Code 1100	Director of Support Services	CAPT J. C. Matheson, USN
1103	Management Engineer	Mr. S. L. Cohen
1104	Patent Counsel	Mr. R. S. Sciascia
1106	Medical Officer	R. J. Stanley, LT(MC), USN
1500	Security & Administrative Services Officer	LCDR J. H. Dal Pian, USN
1800	Personnel Officer	Mr. A. G. Gross
1900	Supply Officer	CDR F. O. Maugans, SC, USN
2000	Head, Technical Information Division	Mr. W. H. Ramey (Acting)
2300	Engineering Services Officer	CDR W. M. Harrison, USN
2500	Public Works Officer	LCDR S. D. Lowe, CEC, USN
2700	Chesapeake Bay Division Officer	CDR R. M. Jonson, USN

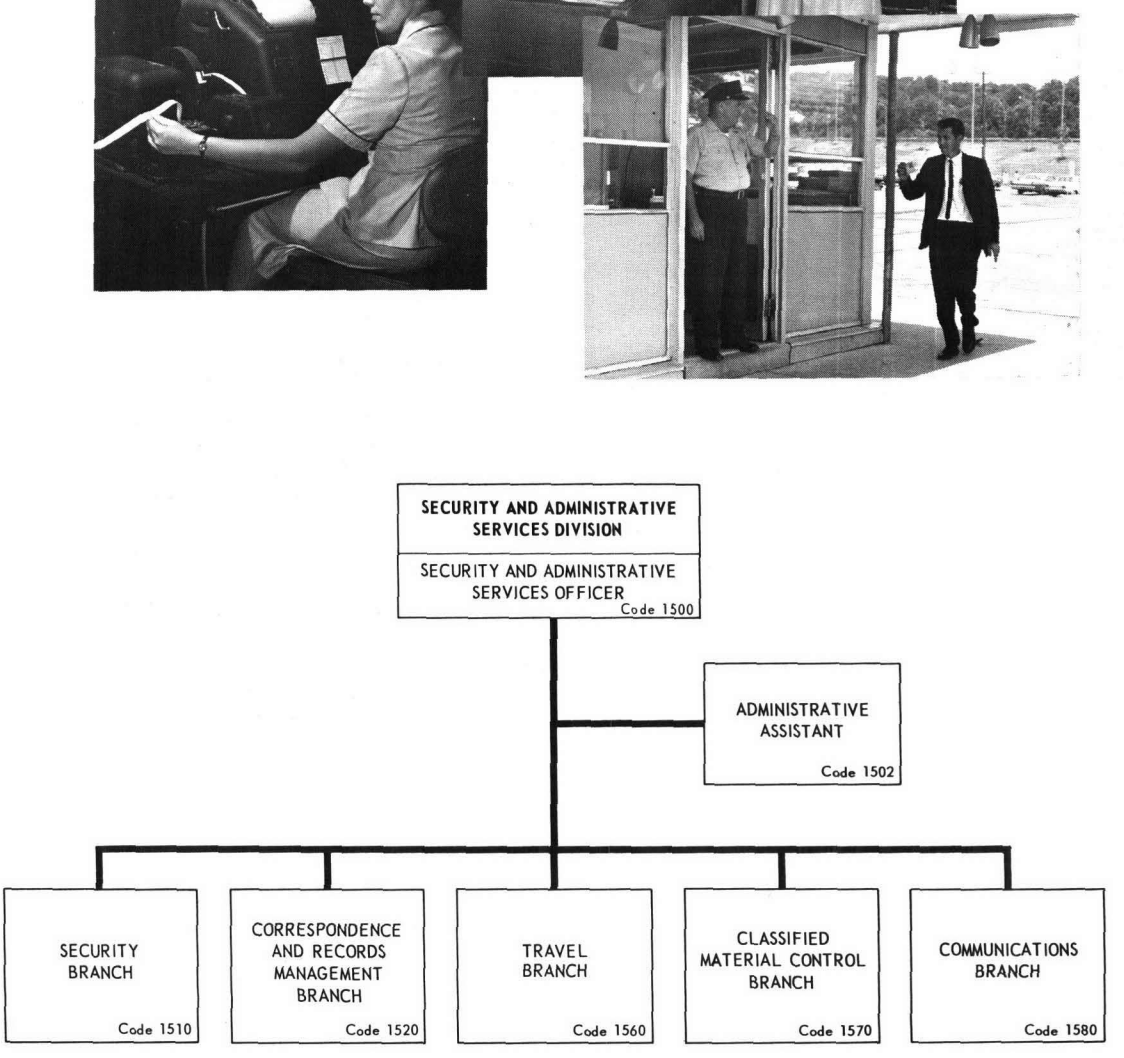
Captain James C. Matheson, USN
Director of Support Services
Naval Research Laboratory

Captain James C. Matheson [redacted]. Following graduation from the Naval Academy in 1944, he spent five years on submarine duty, serving aboard the USS DACE in the Pacific theatre and the USS MEDREGAL in the Atlantic. Subsequent duty included assignments at Naval shipyards, the Bureau of Ships, and the Atomic Energy Commission. In the ten years prior to coming to NRL, he was associated with the naval nuclear propulsion program. During this period he served as senior AEC representative at the West Milton prototype site of the Knolls Atomic Power Laboratory and as Nuclear Power Superintendent at the Mare Island Naval Shipyard.

Captain Matheson holds a professional engineering degree in naval architecture from the Massachusetts Institute of Technology and a master's degree in nuclear engineering from the same institution.

SECURITY AND ADMINISTRATIVE SERVICES

- SECURITY
- CORRESPONDENCE & RECORDS MANAGEMENT
- TRAVEL
- CLASSIFIED MATERIAL CONTROL
- COMMUNICATIONS



BASIC RESPONSIBILITIES

The Security and Administrative Services Division is responsible for personnel and plant security, communications, correspondence and record management, and travel for the Laboratory. The Security and Administrative Services Officer acts as Top Secret Control Officer and as Classified Material Control Officer.

Key Personnel

Name	*Title*	*Grade or Rank*
J. H. Dal Pian	Security and Administrative Services Officer	LCDR, USN
Mr. C. J. Dryer	Deputy Security Officer	GS-12
Mr. J. M. Manser	Head, Physical Security Section	GS-9
* J. W. Hawkins	Fire Chief, Fire Unit	GS-10
Mrs. M. G. Beall	Head, Correspondence and Records Management Branch	GS-9
Mrs. B. E. Michaud	Head, Travel Branch	GS-8
Mr. J. J. Bagley	Head, Classified Material Control Branch	GS-14
Barbara L. Gregory	Head, Communications Branch (Communications Officer)	LTJG(W), USNR

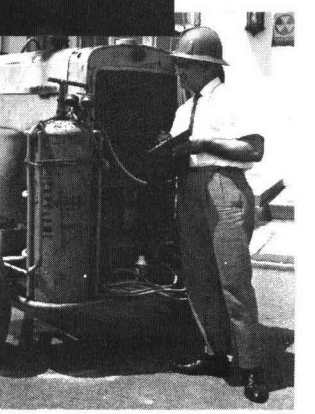
Personnel Complement

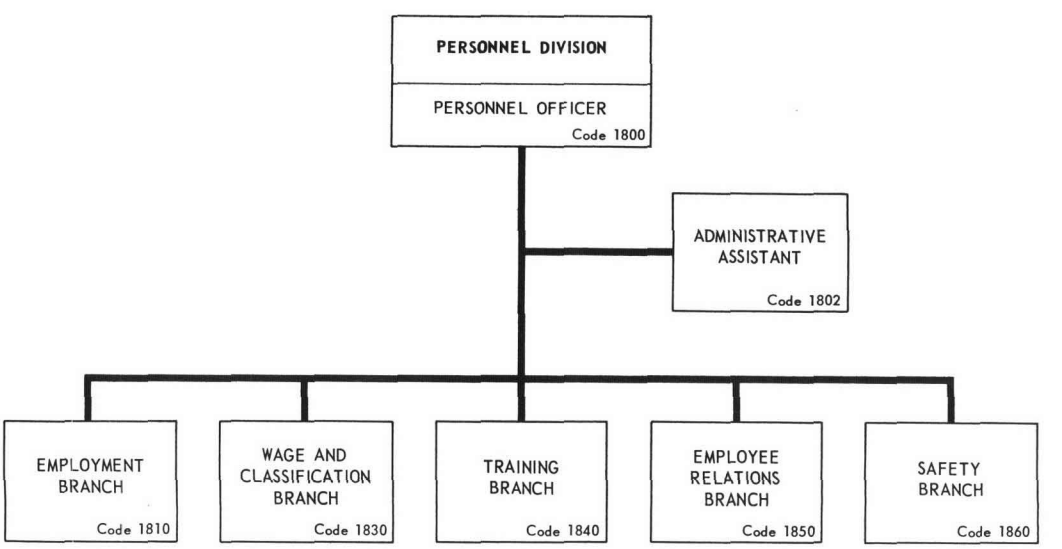
Ceiling		On Board	
Graded:	109	Graded:	104
Ungraded:	2	Ungraded:	2
Military:	3	Military:	3
Total:	114	Total:	109

*Personnel of the Fire Unit are under the administrative control of the Naval Station, Washington, D. C.

PERSONNEL

- EMPLOYMENT
- WAGE AND CLASSIFICATION
- TRAINING
- EMPLOYEE RELATIONS
- SAFETY





BASIC RESPONSIBILITIES

The Personnel Division administers the Laboratory's personnel program, which provides for the selection, development, promotion, utilization, appropriate recognition, and safety of all civilian personnel. It is also responsible for the establishment and review of all Classification Act and ungraded positions.

Key Personnel

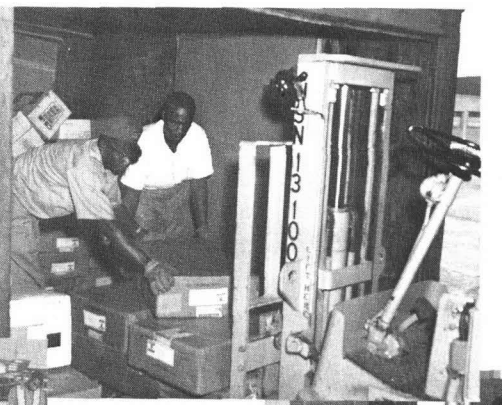
Name	*Title*	*Grade*
Mr. A. G. Gross	Personnel Officer	GS-15
Mr. C. N. Mason, Jr.	Head, Employment Branch	GS-13
Mr. K. R. Harper	Head, Wage and Classification Branch	GS-13
Mr. W. J. McLaughlin	Head, Training Branch	GS-13
Mr. H. H. Kay	Head, Employee Relations Branch	GS-13
Dr. R. G. Nebelung	Head, Safety Branch	GS-14

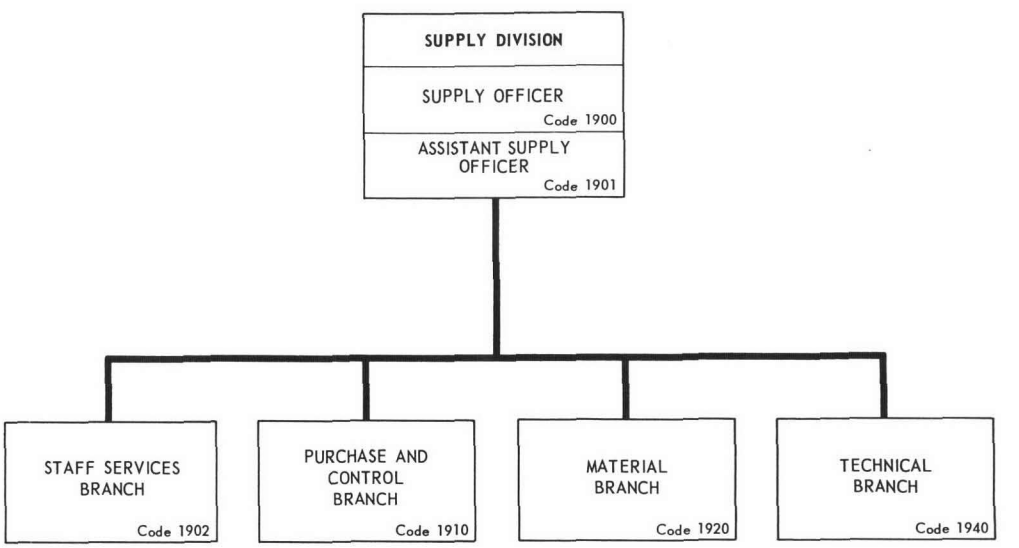
Personnel Complement

Ceiling: 51 On Board: 47

SUPPLY

- STAFF SERVICES
- PURCHASE & CONTROL
- MATERIAL
- TECHNICAL





BASIC RESPONSIBILITIES

The Supply Division is responsible for the operation of all supply functions of the Naval Research Laboratory. These include procurement, stock control, and contract administration; physical receipt, storage, issue, sales, delivery, and shipment of supplies; and the conduct of inventories.

During 1965 the average monthly activity was 3,955 purchase actions totaling $2,160,999.

Key Personnel

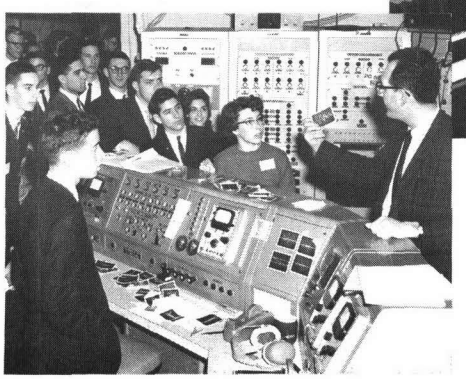
Name	*Title*	*Rank or Grade*
F. O. Maugans	Supply Officer	CDR (SC), USN
T. J. Naughton	Assistant Supply Officer	LCDR (SC), USN
Mrs. I. L. Bivins	Head, Purchase and Control Branch	GS-13
Mr. H. W. Dickinson	Head, Material Branch	GS-11
Mr. R. R. Black	Head, Technical Branch	GS-13

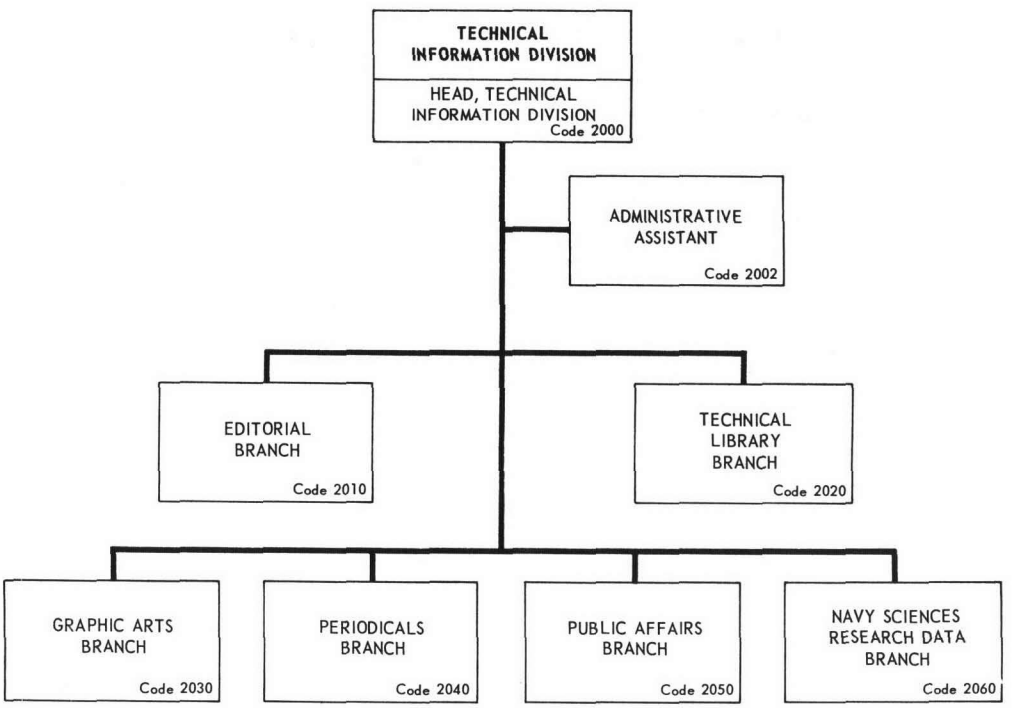
Personnel Complement

Ceiling		On Board	
Graded:	94	Graded:	93
Ungraded:	55	Ungraded:	51
Military:	2	Military:	2
Total:	151	Total:	146

TECHNICAL INFORMATION

- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- PERIODICALS
- PUBLIC AFFAIRS





BASIC RESPONSIBILITIES

The Technical Information Division is responsible for the dissemination of technical information in support of the Laboratory's mission and for providing centralized services to the Laboratory in the general fields of photography, reproduction, editing, public affairs, and documentation. As an additional duty assignment, the Head of the Technical Information Division advises the Chief of Naval Research on printing and publication matters and directs certain information gathering, publication, and information dissemination programs for the Office of Naval Research.

Key Personnel

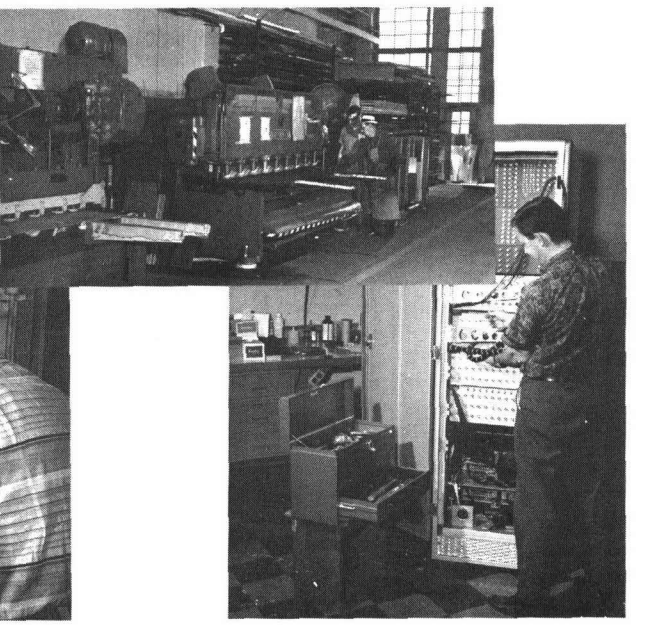
Name	*Title*	*Grade*
Mr. W. H. Ramey	Head, Technical Information Division (Acting)	GS-13
Miss LaVera A. Morgan	Librarian	GS-14
Miss A. Pingell	Translator	GS-12
Mrs. Doris P. Baster	Head, Library Services Section	GS-13
Mrs. D. Folen	Head, Documents Section	GS-12
Mr. W. H. Ramey	Head, Graphic Arts Branch	GS-13
Mr. W. M. Leak	Head, Periodicals Branch	GS-13
Mr. I. Rudin	Head, Editorial Branch	GS-14
Mr. J. Lister	Public Affairs Officer	GS-13

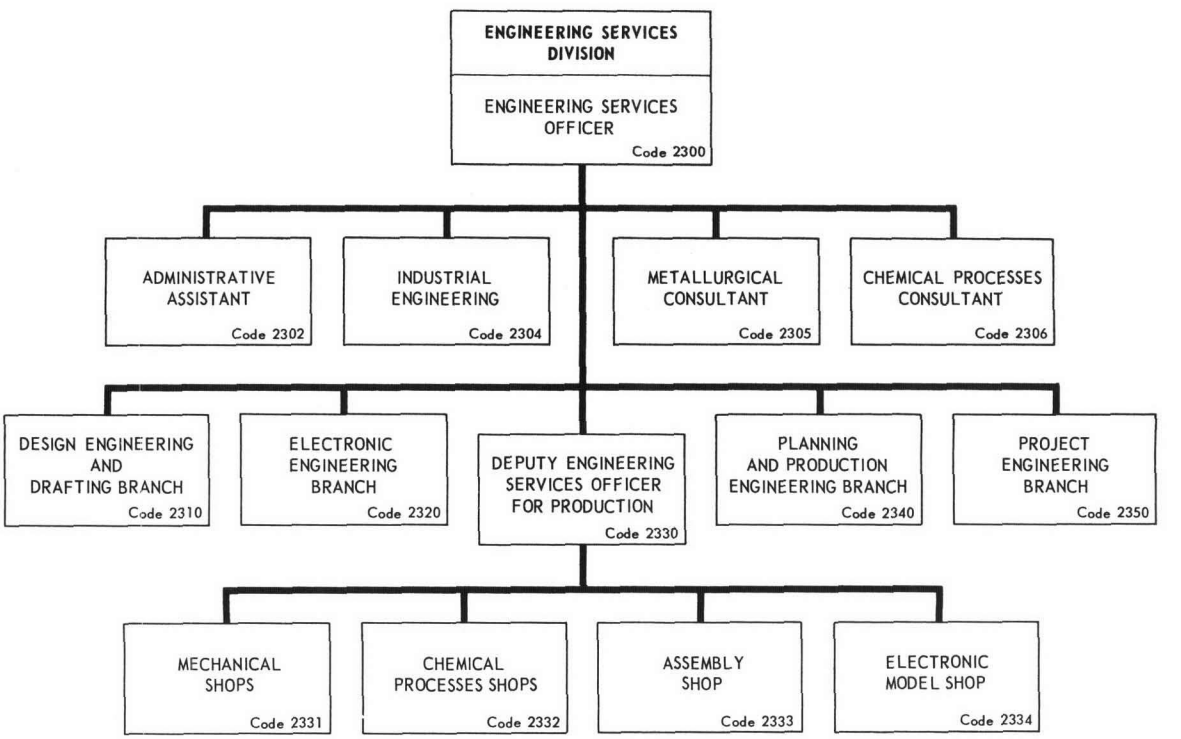
Personnel Complement

Ceiling		On Board	
Graded:	131	Graded:	120
Ungraded:	17	Ungraded:	17
Total:	148	Total:	137

ENGINEERING SERVICES

- DESIGN ENGINEERING & DRAFTING
- ELECTRONIC ENGINEERING
- MECHANICAL SHOPS
- CHEMICAL PROCESSES SHOPS
- ASSEMBLY SHOP
- ELECTRONIC MODEL SHOP
- PLANNING & PRODUCTION ENGINEERING
- PROJECT ENGINEERING





BASIC RESPONSIBILITIES

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

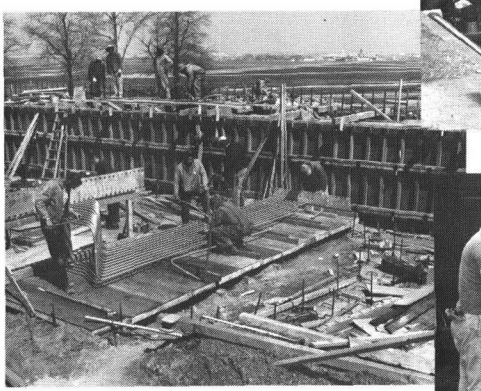
Name	*Title*	*Grade or Rank*
W. M. Harrison	Engineering Services Officer	CDR, USN
Mr. J. G. Schumacher	Staff Assistant for Special Projects	GS-15
Mr. J. M. Cole	Industrial Engineer	GS-13
Mr. R. D. Arritt	Reliability and Quality Assurance	GS-13
Mr. M. A. Shimkus	Head, Design Engineering & Drafting (Acting)	GS-13
Mr. P. R. Shifflett	Head, Electronics Engineering	GS-15
Mr. J. P. Manning	Deputy Engineering Services Officer for Production	GS-15
Mr. J. L. Woods	Head, Mechanical Shops	Master Mechanic
Mr. J. F. Dytrt	Head, Chemical Processes Shops (Acting)	GS-13
Mr. J. L. Leizear	Head, Assembly Shop (Acting)	GS-13
Mr. J. L. Leizear	Head, Electronic Model Shop (Acting)	GS-13
Mr. S. B. Gutfreund	Head, Planning & Production Engineering (Acting)	GS-13
Dr. L. A. DePue	Head, Project Engineering Branch (Acting)	GS-14

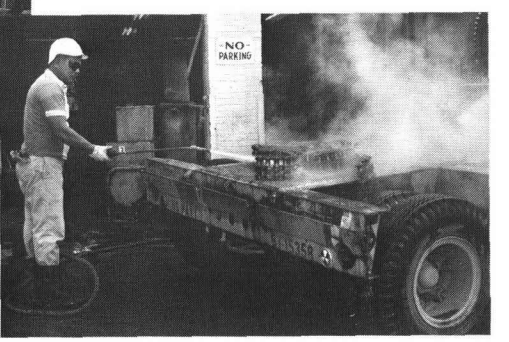
Personnel Complement

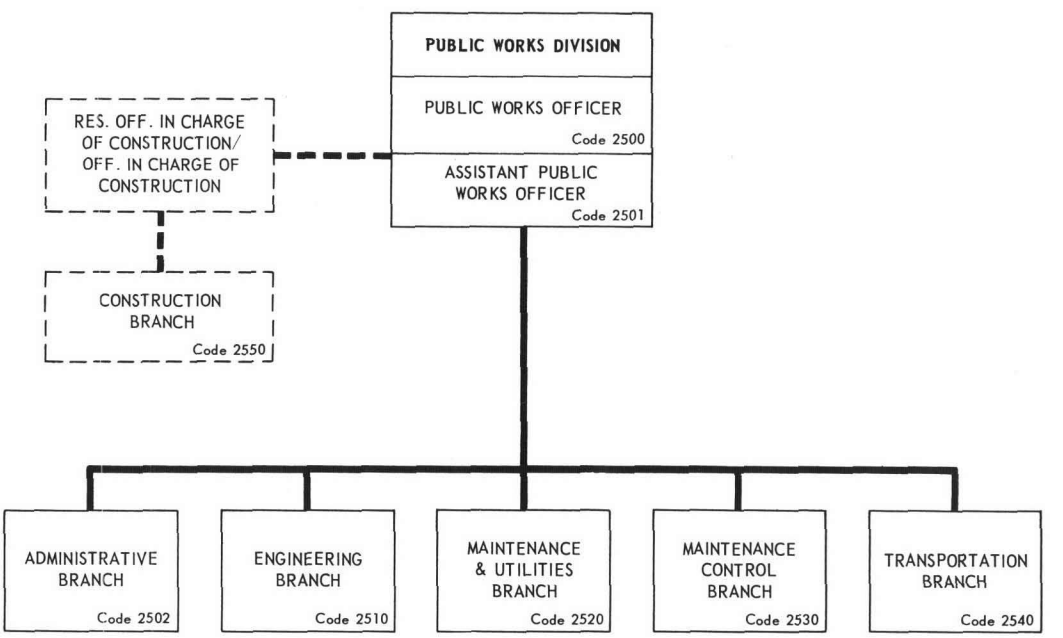
Ceiling		On Board	
Graded:	158	Graded:	147
Ungraded:	435	Ungraded:	392
Military:	1	Military:	1
Total:	594	Total:	540

PUBLIC WORKS

- ENGINEERING
- MAINTENANCE AND UTILITIES
- MAINTENANCE CONTROL
- TRANSPORTATION
- CONSTRUCTION







BASIC RESPONSIBILITIES

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight-handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

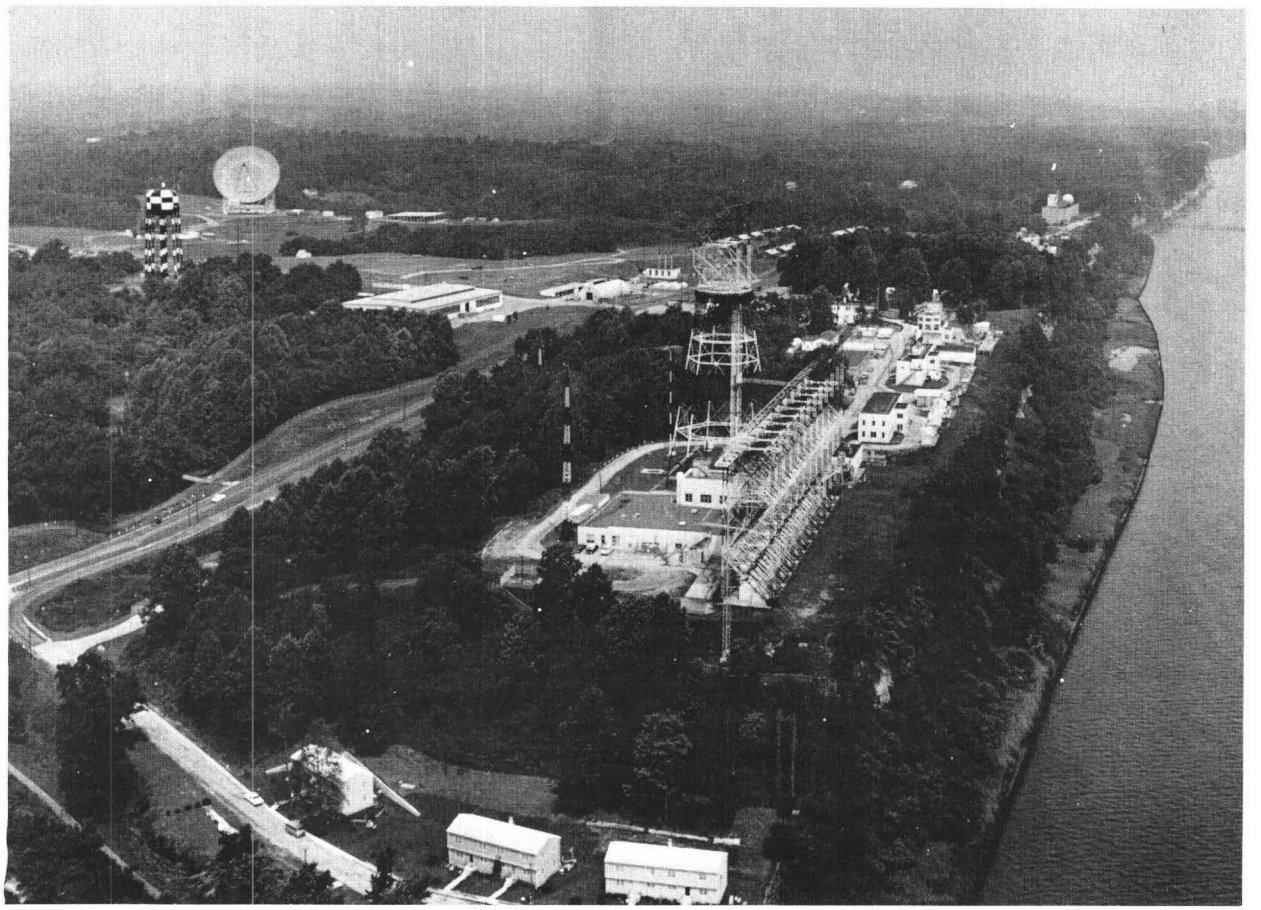
Key Personnel

Name	*Title*	*Grade or Rank*
S. D. Lowe	Public Works Officer	LCDR, USN
R. Y. Wisenbaker	Asst. Public Works Officer	LT, USN
Mr. J. R. Lescault	Administrative Officer	GS-13
Mr. R. J. Zampell	Head, Engineering Branch	GS-14
Mr. A. N. Gawthrop	Head, Maintenance & Utilities Branch	Master Mechanic
Mr. G. Seaver, Jr.	Head, Maintenance Control Branch	GS-12
Mr. C. P. Trexler	Head, Transportation Branch	Quarterman
*Mr. C. R. Parsons	Construction Engineer (ROICC/OICC)	GS-13

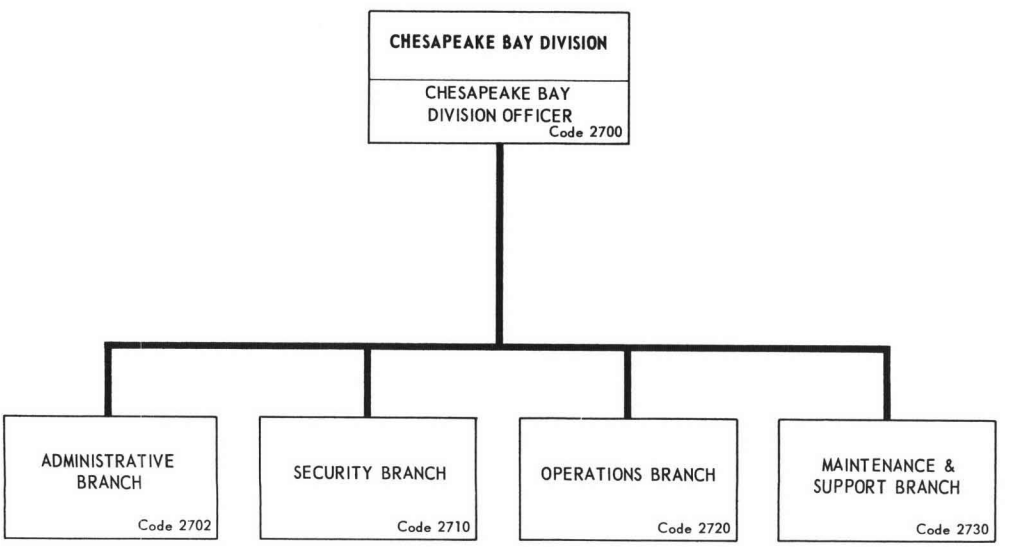
Personnel Complement

Ceiling		On Board	
Graded:	47	Graded:	41
Ungraded:	379	Ungraded:	347
Military:	2	Military:	2
Total:	428	Total:	390

*On ceiling of Naval Facilities Engineering Command (Chesapeake Division)



Aerial view of Chesapeake Bay Division
Chesapeake Beach, Md.



BASIC RESPONSIBILITIES

The Chesapeake Division provides and maintains facilities and services for test, development, and evaluation of radar, radio, and fire control equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

THE PHYSICAL PLANT

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 198 structures of various size and construction, six of which are major laboratory buildings. There are over 200 feet of usable dock space with a water depth of 4 to 7 feet. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at distance of about 10 miles; the Theodolite House, at North Beach; and the Off Shore Platform, approximately 2 miles southeast of CBD in the Bay.

Two 36-foot diesel-powered boats and five wherries are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters, a barracks of 10 rooms, and a dormitory of 11 rooms.

Key Personnel

Name	*Title*	*Grade or Rank*
R. M. Jonson	Division Officer	CDR, USN
R. N. Dearborn	Security Officer	LT, USNR
T. D. Brunson	Operations Officer	BMCM, USN
F. R. Theodore	Administrative Officer	GS-11
R. M. Conlyn	Station Engineer	GS-13

Research Division Representatives

Applications Research Division

A. C. Grosvenor, Data Processing Branch
A. K. Bramlett, Operations Research Branch
W. L. Landreth, CIC Facility Branch

Radar Division

M. W. Lehman, Search Radar Branch
J. R. Ward, Equipment Research Branch

Mechanics Division

C. D. Porter, Dynamics Branch

Optical Physics Division

T. A. Cosden, Division Representative

Ocean Sciences and Engineering Division

D. F. Wilson, Marine Biology and Biochemistry Branch

Personnel Complement

Ceiling		On Board	
Graded:	34	Graded:	30
Ungraded:	63	Ungraded:	61
Military:	4	Military:	3
Total:	101	Total:	94

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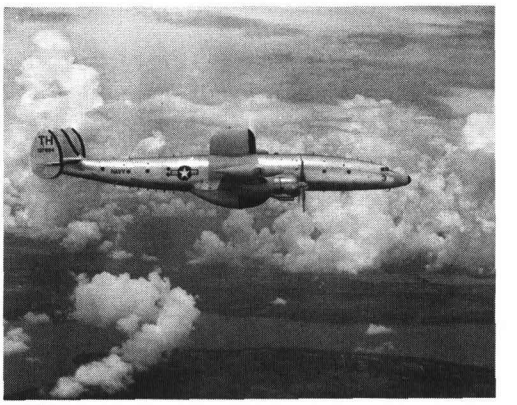
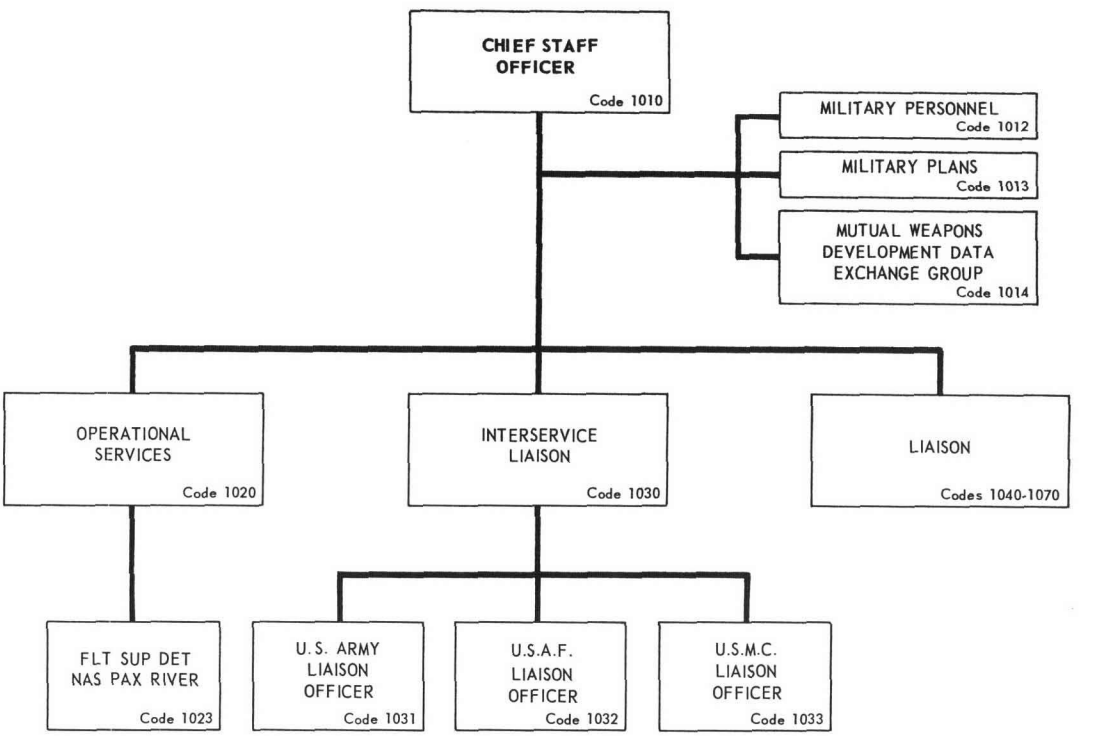
Chief Staff Officer

CHIEF STAFF OFFICER

- MILITARY PERSONNEL
- MILITARY PLANS
- MUTUAL WEAPONS DEVELOPMENT DATA EXCHANGE GROUP
- OPERATIONAL SERVICES
- INTERSERVICE LIAISON
- NAVY LIAISON





BASIC RESPONSIBILITIES

The Chief Staff Officer maintains liaison with the systems commands and offices of the Navy Department, with other units of the Naval establishment ashore and afloat, and with other governmental and nongovernmental agencies concerned with the coordination of military application of the scientific work of the Laboratory. He relates definite experience with the scientific organization to the planning objectives and operational requirements of the Navy. He provides such operational services to the Laboratory as are required.

Key Personnel

Name	*Title*	*Grade or Rank*
R. M. Davis	Chief Staff Officer	CAPT, USN
A. V. McPhillips	Assistant Chief Staff Officer	CDR, USN
M. M. Gibson	Administrative Officer	CDR, USN
B. P. Moore	Operational Services Officer	CDR, USN
G. Caridakis	Interservice Liaison Officer	LTCOL, USMC
R. R. Hayman	Scientific Liaison Officer	CDR, USN
Mr. F. Shannon	Mutual Weapons Development Data Exchange	GS-13
H. D. Fechtelkotter	Officer in Charge, Patuxent River Detachment	CDR, USN

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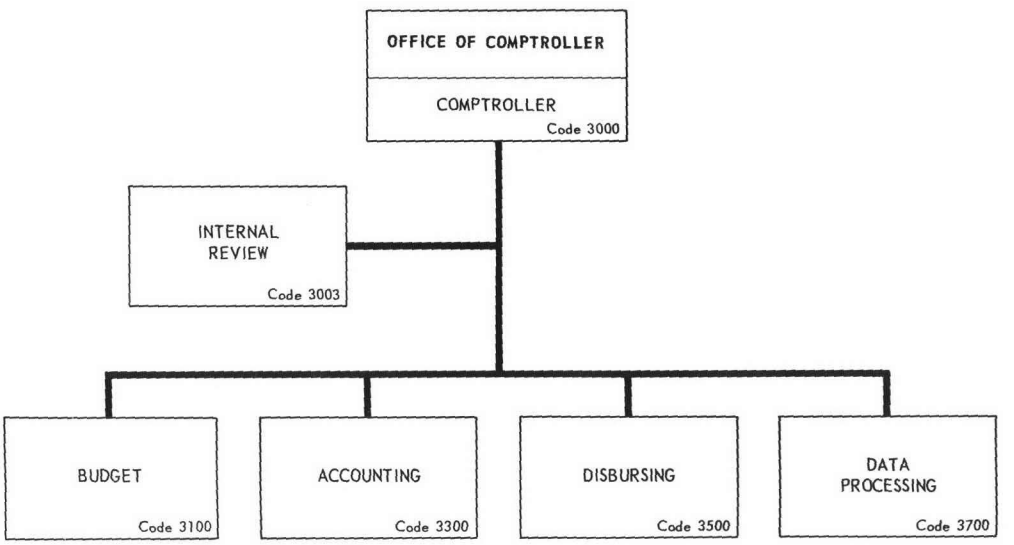
Office of Comptroller

COMPTROLLER

- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



BASIC RESPONSIBILITIES

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers, as a staff function, the financial program of the Laboratory.

Key Personnel

Name	*Title*	*Grade or Rank*
Mr. J. P. Donovan	Comptroller	GS-15
Mr. J. O. Berry	Budget Officer	GS-13
Mr. D. L. Paolo	Accounting Officer	GS-13
Mrs. D. A. Lundberg	Data Processing Officer	GS-12
R. J. Colangelo	Disbursing Officer	LTJG (SC), USNR
Mr. F. R. Wiley	Head, Internal Review Staff	GS-13

Personnel Complement

Ceiling: 85 On Board: 76